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A

HANDBOOK

OF THE PRACTICE OF

FORENSIC MEDICIN

BASED UPON PERSONAL EXPERIENCE.

BY

JOHANN LUDWIG CASPER, M.D.,1796

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CONTENTS.

SECTION SECOND.

Page
Dynamic death 1
§ 20. General 1

CHAPTER I.

Death from hæmorrhage and exhaustion . . . 2
§ 21. Mode of origin and diagnosis . . . 2
§ 22. Illustrative cases.—A. Death from hæmorrhage . . 5
B. Death from exhaustion . . 7
§ 23. Is the case one of suicide or homicide? . . 12
§ 24. Illustrative cases 14

CHAPTER II.

Death from starvation 28
§ 25. General.—Case of starvation for ten days without death . 28
§ 26. Continuation.—Diagnosis 32
§ 27. Illustrative cases 33

CHAPTER III.

Death from poisoning 38
§ 28. Definition of the term poison, and classification of poisons 39
§ 29. Continuation 43
§ 30. Determination of the fact 45
§ 31.—(*a*) The morbid phenomena 47
§ 32.—(*b*) Appearances on dissection . . . 49
§ 33.—(*c*) The chemical analysis 52
§ 34.— Special poisons . . . 55
§ 35.—(*d*) The individual peculiarities of the case . . 65
§ 36.— Conclusions 68
§ 37. Homicide or suicide 70
§ 38. Illustrative cases 70

CASPER

ON

FORENSIC MEDICINE.

SECTION SECOND.

DYNAMIC DEATH.

§ 20. GENERAL.

IN this section we include all those forms of death which are not produced, at least are not specially produced, like those included in the previous section, by mechanical injury of the organic machine, but are brought about dynamically. Such are all the forms of death produced by ANÆMIA, from Hæmorrhage, Starvation and Exhaustion; by DYSÆMIA from Poisoning and Pyæmia; by HYPERÆMIA, including most cases of Death from Drowning, Hanging, Suffocation, and Excessive Cold, and by NEUROPARALYSIS, in which way also many of these unfortunates perish.

CHAPTER I.

DEATH FROM HÆMORRHAGE AND EXHAUSTION.

§ 21. MODE OF ORIGIN AND DIAGNOSIS.

THE diagnosis of this form of death is extremely easy, and can only be obscured by one circumstance—the putrefaction of the body. On external inspection, the lips and gums are found of a dirty pale-red, and the body in most cases of a waxy-white colour; to this, however, *the exceptions are by no means rare,* and in these even the most experienced observer would not expect, from the perfectly normal colour of the corpse, to find that death had occurred from internal hæmorrhage. Following Devergie, all the recent handbooks teach that after death from hæmorrhage post-mortem stainings are absent. I have already (§ 8, Gen. Div., p. 20) corrected this error; the inspection of the body of any one who has died from such a cause will at once prove the truth of my statements. Usually, when not perfectly cleansed, the body and its clothing are copiously soiled with blood, presupposing, of course, that the fatal hæmorrhage has not been internal. The internal inspection exhibits total anæmia, or, at least, great deficiency of blood in all the large venous trunks, except the *veins of the pia mater,* which are *rarely empty, or even strikingly anæmic,* but are generally, particularly such as are at all dependent, visibly filled with blood (from hypostasis). This fact, which practical observation has taught us to be constant, must be ever remembered; lest in some individual case a difference of opinion should arise as to the death being really due to hæmorrhage, because the cerebral veins are still visibly full of blood. Besides the large blood-vessels, all the vascular organs are found anæmic, and therefore paler than after other forms of death—a change of colour in no other organ more visible than in the lungs of an adult, which in such cases are of a light-grey colour, marbled with dark patches. Moreover, in cases of internal hæmorrhage, the effused blood is found in the cavities into which it has been poured, sometimes fluid, sometimes coagulated, sometimes rtly both. All these positive diagnostic appearances may, however, be obscured by the putrefactive process, and are indeed obscured in every case in which this process is already so far advanced that the waxy-white of the surface of the body and the pale colour of the internal organs have been merged in the hues of putrescence, when the general anæmia may be just as equitably supposed to be due to evaporation from putrefaction, which is a never failing occurrence, as to any problematical hæmorrhage. Any human corpse, however, that distinctly exhibits the appearances described is indubitably that of an individual who has died from hæmorrhage. This kind of death occurs when a large quantity of blood escapes from the vessels, and is thus withdrawn from the circulation, so that the heart and lungs are paralyzed, whether the blood has altogether escaped from the body, or has been merely effused into one of its cavities. How much blood a man must lose before he die is a question as interesting for the physiologist as it is immaterial for the medical jurist, particularly since there is now no longer any question, legally or practically, regarding the existence of any absolute or individual lethality. The medical jurist must look upon *death as having occurred from hæmorrhage,* when the appearances described are found in a dead body in nowise altered by putrescence, in which no other cause of death can be discovered. We have already several times had occasion to remark that the non-discovery of the source of the hæmorrhage gives no cause to doubt the correctness of the opinion, nor to throw blame upon the medical inspectors. Very often, indeed, it is quite easy to discover this source; for instance, in the case of ruptures and injuries of internal organs and large blood-vessels; but at other times, when the source of the hæmorrhage is, as it often is, some imperceptible opening in a deep-seated and minute blood-vessel, which the most careful search cannot discover, it is perfectly impossible to detect it without making use of methods which it is just as impossible to employ at the time of the autopsy, as their result is useless in relation to the main object of the inquiry.

External hæmorrhage follows wounds from stabs, cuts, blows, and firearms, which may happen to injure the more superficially situated vessels, such as those of the extremities, of the neck, the temples, &c. This kind of death very often follows stabs, cuts, and blows, and sometimes, also gun-shot wounds. We have already treated of these wounds in § 35, Gen. Div., Vol. I., p. 127, and in § 10, Spec. Div., Vol. I., p. 265. Bleeding from the umbilical cord is also an external hæmorrhage, treated of in its proper place (§ 117).

Internal hæmorrhages generally arise from similar injuries where the vessels and organs in the internal cavities have been wounded, and also from ruptures of these internal organs, and, in the latter case, it is not necessary that the organ lacerated be itself immediately struck or wounded. The discovery of such ruptures—which have been already described (§ 36, Vol. I., p. 131)—presupposes the application to the body of very considerable external violence in every case in which the organ ruptured has been previously healthy. Since healthy lungs, heart, liver, or spleen, never rupture spontaneously from internal causes. In the case of cerebral hæmorrhage, this may be open to doubt, and it is precisely these cases of internal hæmorrhage that possess a peculiar practical interest for the medical jurist, on account of the great frequency of cranial injuries. But besides, that in spontaneous cerebral hæmorrhage a careful examination of the ruptured vessel often brings to light the existence of ossification or other anormality, experience also teaches, that in spontaneous cerebral hæmorrhage there is, in most cases, only a very small amount of blood extravasated, whilst in that following injuries the amount of blood effused is always much more considerable. We can scarcely err, therefore, in regarding the discovery of VERY EXTENSIVE AND CONSIDERABLE EXTRAVASATION OF BLOOD WITHIN THE CRANIAL CAVITY, in dubious cases, as evidence that the cause of death has *not been spontaneous apoplexy*, but the application of EXTERNAL VIOLENCE.

Death from exhaustion occurs when, from the persistent loss of corporeal fluids of any kind, and the simultaneous embarrassment of the reproduction of the blood, the wants of the body come to exceed its supplies, until at length this disparity increases to a degree incompatible with the continuance of life. To this category also belong those too common cases, in which death occurs from hectic fever, resulting from an injury received weeks or months previously, and followed by suppuration of a healthy or unhealthy character. This kind of death is established by the discovery of an extreme degree of emaciation of the corpse, a total absence of fat externally or internally, a general anæmic state of the body, precisely like that which results from fatal hæmorrhage; and by the discovery of the previous suppuration, *decubitus*, or the like, according to the circumstances of the case. To this category of death from general exhaustion also belong those cases, that so frequently occur in low life, and therefore in judicial practice, of *immoderate punishment* or *ill-usage* of every kind, as well of adults as of children. Death in such cases occurs sometimes suddenly from actual neuroparalysis, sometimes, and that most usually, some little time after the infliction of the injuries; and it is a remarkable fact, confirmed by experience, that the person ill-used is often able to walk some distance, or perform some light work, &c., before falling down to die. This kind of death is recognised by the evident traces of injuries on the external surface of the body, without there being of necessity any positive internal appearance to confirm the diagnosis; on the contrary, any such appearance is usually entirely absent. In such cases, many of which have come before us, it is always to be remembered that each of the many, often innumerable external injuries, livid patches, stripes, marks of the rod, excoriations, scratches or bites, may by itself be utterly insignificant, and that it is only their multiplicity that has produced this fatal exhaustion.

§ 22. Illustrative Cases.—a. Death from Hæmorrhage.

Case CLII.—Wound of the external Iliac Artery.

A wound of the external iliac artery is much more rare than a wound of any of the large vessels of the neck. A young factory workman, aged 18, was stabbed during a riot; he fell to the ground exclaiming, "I am stabbed—in the breast—" and shortly died. The body was much soiled with blood, and exhibited an unusual anæmic condition of the liver and spleen, the abdominal veins were completely empty, the lungs, heart, and large thoracic veins were unusually anæmic; there was very little blood in the cranial cavity, and the whole of the peritoneal tissues were infiltrated with extravasated blood. It was found that the external iliac artery, behind Poupart's ligament, was almost completely cut through, a portion of the posterior wall of the artery, a line broad, being all that was left undivided.

Case CLIII.—Wound of the Pericardium and Lungs.

A young blackguard, whose uncanny physiognomy I can never forget, had murdered his master, aged 32, with *thirty-two* separate stabs with a table-knife, which had followed one another in furious haste! The wounds of the lungs were the actual cause of death. In the superior lobe of the right lung there was a wound three-eighths of an inch long, and a second one three-quarters of an inch long, not far removed, and two quarts of blood were effused into this pleural cavity. Beneath the left clavicle there was a gaping wound three-quarters of an inch long, with ecchymosed edges, which penetrated the pleura, and another wound half-an-inch long, which had slightly penetrated the apex of the left lung, and from which half-a-quart of red fluid blood had flowed. The pericardium was slit open for a quarter of an inch.* (The capital punishment to which the youthful criminal was condemned, was graciously commuted to imprisonment for life.)

Case CLIV.—Wound of the Heart and Diaphragm.

A woman, aged 34, died instantaneously from hæmorrhage, from a wound of the heart, produced by a blow with a triangular instrument ground sharp, which had perforated the left ventricle. The wound had also traversed the anterior edge of the left lung and the diaphragm. It was somewhat remarkable to find the tongue jammed between the teeth, as this is not usually expected to be found in cases of death from hæmorrhage. We shall, by-and-by, have something to say as to the importance of this symptom in a medico-legal point of view.

Case CLV.—Wound of the Diaphragm, Liver, and Stomach.

Death followed a wound of these three organs in twelve hours. The edges of the wound were ecchymosed, both externally and internally. The wound traversed the muscular part of the diaphragm close to the central tendon; it was here one inch in length, and its edges were deeply ecchymosed. The sharp edge of the left lobe of the liver was cut to the extent of three-eighths of an inch, and on the anterior surface of the stomach there was a wound an inch and a-quarter long, the edges of which were also deeply ecchymosed. The veritable stiletto wound of an Italian bandit! The thyroid gland of this body presented a pathologico-anatomical rarity; for in its right half there was a cavity the size of a walnut, containing pieces of bone, and lardaceous matter inclosed in an osseous cyst. This was therefore an osteo-steatomatous tumour of the thyroid (or goitre).

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* *Vid.* Cases XLVIII., XLIX., and LI., § 33, Gen. Div., Vol. I.

CASE CLVI.—FATAL HÆMORRHAGE FROM THE SAPHENOUS VEIN.

The following case strikingly exhibits how unexpectedly a man may lose his life, even when he dreams not of the possibility of being exposed to danger, for instance—when he makes use of his chamberpot. This remarkable case was that of a widow of a trumpeter, aged 50, who in making water was killed by her chamberpot. This vessel, made of so-called sanitary-ware (a coarse porcelain), was certainly broken, and had sharp points and edges. In elevating it beneath her dress, she wounded herself, and was afterwards found dead in her room. The chamberpot exhibited appeared externally full of blood, and actually did contain coagulated blood. On the lower part of the left thigh there was a wound one inch and three-quarters long, and three-quarters of an inch wide, with obtuse edges; the immediate margin of the wound certainly exhibited no trace of ecchymosis, but in the subcutaneous cellular tissue adjoining there was an abundant ecchymosis, the *vena saphena* of this leg had an opening in it the size of a pea. The general anæmia of the body was most remarkable; but the veins of the *pia mater* in this case also did not partake of this general anæmia (Vol. I., p. 319).

CASE CLVII.—FATAL HÆMORRHAGE FOLLOWING PARTURITION.

In this case the phenomena resulting from putrescence were mingled with those of hæmorrhagic anæmia, just as we have already described at p. 320. The child was precipitated into the world while the mother was standing, the umbilical cord was torn across, and the child—as was proved by the appearances found on dissection—was killed by being dashed against the floor of the apartment; whilst the mother, an unmarried woman, aged 24, died of uterine hæmorrhage immediately after the birth.

At the time of the autopsy, the body was already so much putrefied, that its waxy colour could no longer be discerned. The abdomen was extraordinarily distended. (An experiment which we frequently perform in such cases, was in this one unusually successful; the gas which escaped through a small puncture in the abdominal coverings, was lighted, and it burned for two minutes with a brilliant flame two inches and a-half long.) The whole body was perfectly anæmic, but both pleural cavities contained three ounces of bloody serum—a post-mortem product. Colostrum could be expressed from the breasts, The vagina, which was much dilated, was quite putrefied. The uterus was quite empty and uninjured, its walls thin and flabby, and it measured (immediately after parturition) nine inches long by six broad. The perineum was lacerated to the extent of one inch. On the bed-cover in which the body was rolled, there lay a putrid placenta, and attached to it there was an umbilical cord five inches long and torn across; its torn edges corresponded with those upon the remains of the cord attached to the child.

CASE CLVIII.—MURDER OF A CHILD BY CUTTING ITS THROAT.

On the 9th of February (during severe frost), N., a young unmarried woman, gave rapid birth to her first child (a girl in the ninth month) while sitting on the chamberpot. The child was shot into the utensil, and was speedily followed by the placenta. She confessed that it was born alive, and that to prevent its crying she stuck her finger in its mouth, and that shortly after there was no longer any sign of life to be perceived. At the first judicial precognition, when the result of our examination of the body had been communicated to her, she confessed, after some hesitation, that, fearing the child would come alive again, she cut its throat with a bread-knife. About ten days afterwards, on the 19th, the child was given over to us for examination, being still perfectly fresh by reason of the severe cold. It was eighteen inches and a-half long, and weighed only about five pounds (imp.); the cranial diameters were three, three and one-quarter, and four and three-quarter inches; the breadth across the shoulders was three inches and three quarters; the thorax measured transversely three inches, and vertically two inches and three-quarters; the breadth across the hips was three inches. Everything else about the child also denoted that it had not yet arrived at complete maturity. On the left side of the neck there was a gaping wound, one inch and a-quarter long and seven-eighths of an inch wide, the edges of which were partly cleanly cut, and partly jagged, covered with moist blood and not ecchymosed; in the bottom of the wound part of the sterno-mastoid muscle and the half of the thyroid gland were distinctly visible. Separated from this wound by an isthmus of skin a line broad, there was a second semicircular and quite superficial wound, three-quarters of an inch long and half-an-inch broad; its edges were similar to those of the last; when the head was bent forwards, both of these ds were found to run in the same direction (the conclusion being that both resulted from only one cut). The diaphragm stood between the fourth and fifth ribs. The right lung was tolerably far advanced into the cavity of the thorax, the left was quite contracted. Both lungs with the heart weighed rather more than one ounce and a-half (imp.), and without the heart, only a trifle above fourteen drachms (imp.). Their colour was a bright but pale cinnabar-red. They floated perfectly both when entire and after being cut in pieces. Repeated incisions revealed a most distinct sound of crepitation, and gave vent to much froth, which was, however, but slightly bloody. The trachea was pale and empty. All the cavities of the heart were perfectly empty of blood. On examining the wound in the neck, the carotid artery and jugular vein were found perfectly uninjured. There was no coagulated blood in the bottom of the wound. The only thing else worthy of mention in regard to the other appearances was the most remarkable general anæmia of the whole body. Our opinion could not be doubtful. The child was indubitably viable, and had lived after its birth, as was proved both by the *docimasia pulmonaris*, and also by the nature of the death: it had died from hæmorrhage (which of course presupposed the existence of life), and the wound in the neck had been the cause of its death. It was perfectly evident, that sticking the finger in the mouth of the child, which was confessed, had not killed the child, inasmuch as there were no appearances attributable to death from asphyxia found in the body, and these must have been found had death occurred in this manner. The accused subsequently confessed her guilt, acknowledged that she killed the child intentionally, and was condemned to ten years' imprisonment.

B. DEATH FROM EXHAUSTION.

CASE CLIX.—THE ELBOW-JOINT OPENED BY A SABRE-CUT.—AMPUTATION.—DEATH.

The elbow-joint of a man was struck by the blow of a sabre and laid open. Twelve hours after the receipt of the injury, it was amputated in the Charité Hospital. According to the Hospital records, this operation was urgently required; it was speedily followed by an inflammatory affection of the chest, and the patient died of exudative pleuritis four weeks after the receipt of the injury. The stump of the arm was seven inches long, its edges were partially united, but between them ill-looking greyish-green purulent matter was still to be seen.

The brachial artery, which had been tied, was for one entire inch completely obliterated. The right cavity of the pleura was filled with one quart and a-half of yellowish-green, fluid purulent matter, which had compressed the lung into a leathery compact mass of about one-fourth of its original bulk. On incision the substance of the lung was found to be bright-grey, it contained no bloody froth, but at its base there were many partially softened tubercles. In the left pleural cavity there was an effusion of eight ounces of bloody serum, but the left lung was healthy. On the contrary, the whole of the under surface of the lobes of the right lung were quite destroyed by sinuous suppurating fistulæ. On the inferior surface of the left lobe of the liver there was a still unopened abscess. The right kidney was also completely riddled with suppurating fistulæ. The general emaciation of the body was extreme.

CASE CLX.—A STAB IN THE HEAD AND SHOULDER.—CEREBRAL ABSCESS.

A tradesman, aged 25, was stabbed in a scuffle on the head twice near the centre of the left parietal bone, a third time at the external angle of the left eye, and finally at "the external angle of the left shoulder-blade;" and after the application of a temporary bandage, he was at once removed to the Charité Hospital. At first, under the skilful attention received in the Hospital, everything seemed to go on well, but upon the 8th day (22nd January) a doughy swelling of the scalp set in, accompanied with such violent fever that, on the 23rd, two venesections were considered necessary. This pseudo-erysipelas passed rapidly into suppuration, so that on the 25th the wounds had to be dilated to permit the escape of the pus. The wounds upon the face and shoulder were also enlarged, and on account of the persistence of the fever a third venesection was made. In spite, however, of repeated dilatation of the wounds, purulent infiltrations occurred, the strength gave way; from the 5th of February stimulants became necessary, a typhoid stupor set in, accompanied by diarrhœa; the wounds and their secretion assumed an unhealthy appearance, and the patient died on the 8th of February—twenty-five days after the receipt of the injury—under symptoms referrible to neuroparalysis. The following were the most important appearances found on dissection:—The body was much emaciated. The bones of the vertex, which were of the usual thickness, were bared of periosteum for about the size of a crown-piece, and were in a state of incipient caries. The *dura mater*, on the spot corresponding to the wound of the parietal bone, was perforated like a sieve, and through its openings yellowish-green matter welled forth. After the removal of this covering the whole of the left hemisphere was found to be covered with a layer of yellowish-green, stinking and viscid pus, which could not be wholly removed by the sponge. The whole of the brain was much congested, and the entire posterior half of the *right* hemisphere was transformed into a large abscess filled with greyish-green pus. The injury to the shoulder was of no importance, and the other appearances found may also be omitted as irrelevant.

CASE CLXI.—BLOWS UPON THE HEAD.—CEREBRAL ABSCESS.

A parallel case was exemplified in the suppuration of the brain of a man aged 34, always strong and healthy till he received several blows with a bottle on the head twenty-four days before his death. At the autopsy, the body was found to be mnch emaciated, and the most important appearances were: the left side of the calvarium (corresponding to the part injured) was stripped of its periosteum; there was purulent infiltration between the temporal muscle and the epicranial aponeurosis, extending beneath the zygoma, the dura mater covering the right hemisphere was inflamed, that covering the left hemisphere had on it a deposit of pus the size of half-a-crown; the whole of the left hemisphere was covered with a layer of thick green pus, and the cerebral substance of this hemisphere had suppurated in several isolated larger and smaller patches.

CASE CLXII.—A STAB IN THE LUNG.—SUPPURATION.

A man, aged 41, was stabbed with a knife in the right breast; the external wound, according to the surgical certificate, was half-an-inch long and two lines broad. (A second stab in the middle of the left humerus was of no consequence as to the ultimate result.) A surgeon had at once brought the edges of the wound together (with plaster), applied cold water dressing, and ordered nitre and Glauber's salts. On the *third day* he found the breathing "short and quick, and the pulse oppressed," and he took away four cups of blood. In the afternoon Dr. M. was called to consultation, and he immediately ordered a second venesection to a similar amount, because "he found extensive inflammation of the lungs and pleura, oppressed breathing, cough, with bloody sputa, urine scanty and high coloured, pain in the wounded side, and great restlessness and feeling of anxiety." Next morning there was a fresh venesection, leeches were applied, and a nitrous emulsion ordered. On the next day the patient seemed dying, he lay passive, relaxed, pale and senseless, with a small feeble intermitting pulse. Dr. M. ordered calomel, with sulphuret of gold, nitre, and hyoscyamus, and applied a blister to the chest. On the following day the patient was better; nevertheless, the symptoms of exudation gradually set in, the pus secreted by the wound began to stink, the feet became œdematous, hectic fever set in, and the patient died four and a-half months after the receipt of the wound. At the medico-legal dissection, four-and-twenty ounces of stinking grey purulent matter were found in the left pleural cavity, the pus had partially corroded the intercostal muscles of this side, and its source was found to be an abscess, which included almost two-thirds of the right lung; both lungs were perfectly free from tubercle, so that here we had an example of a purely traumatic suppuration of the lung. The right lung was strongly adherent to the costal pleura, and that part of it not involved in the abscess was in a state of grey hepatization. The other appearances found were unimportant.

§ 23. Is the case one of Suicide or of Homicide?

We have already said (§ 21, Vol. II., p. 4) that very considerable cerebral hæmorrhage seldom or never occurs spontaneously, and that healthy organs never rupture spontaneously; hence it follows, that in the first set of cases we are generally, and in the case of rupture of internal organs we are always justified in presupposing the application to the body of very considerable external violence. But this violence may have been produced either by some unfortunate fall, &c., or it may have resulted through the culpability of a third party. Exceptional cases may occur, such as when one has permitted himself to be run over, or intentionally given himself a violent fall, whereby internal hæmorrhage has been produced in the manner stated, and their true nature will be ascertained from the peculiar circumstances of the case. We have also mentioned (§ 9, Vol. I., p. 264) that contused wounds, which may also give rise to death from hæmorrhage, point with almost absolute certainty to the culpability of a third party; since suicide by wounds of that nature is an unheard-of rarity. Punctured and incised wounds are also frequent occasions of death from hæmorrhage, and both certainly, but particularly the latter, are not infrequently suicidal. In doubtful cases, the question of murder or suicide must in this, as in every other case, be decided from the relative facts extrinsic to the mere appearances on dissection; the combination of all the individual circumstances of the case, and particularly the appearances found on and in the body, and its immediate neighbourhood. It is evident, that the discovery upon or near the body of any weapon used to produce the death, proves just as little as its non-discovery, since the knife of the suicide is just as likely to be stolen from the body, as that of the murderer is to be intentionally left lying near it. In endeavouring to conceal their crime, criminals frequently, from mental deficiency or confusion, go to work so stupidly, that the very precautions they have taken, at once reveal the culpability of a third party. So it happened here about twenty years ago, that a woman and her daughter by a former marriage, having killed their husband and stepfather by cutting his throat with his razor while asleep, sought to make it appear an act of suicide by folding the hands together and sticking the bloody razor into them! This case, like the well-known one related by Gruner, and a few others, shows, however, that the direction of the punctured or incised wound is in so far not decisive of suicide, inasmuch as wounds which from their great certainty are chiefly selected by suicides, such as stabs in the heart or incisions in the cervical vessels, are very often also inflicted by third parties, in order to raise the suspicion of suicide. The course and direction of a wound can therefore only testify with absolute certainty against the supposition of suicide, when it would have been impossible for the person to produce such a wound with his own hand; for example, when the body displays a stab, which commences behind and runs from above downwards towards the anterior part of the lung. In suicidal wounds of the throat, the wound certainly usually runs from left to right, and from above downwards. I have, however, already stated (§ 35, Gen. Div., Vol. I., p. 129), how difficult it is in general to decide where such a wound commences and where it ends, while the direction of course depends upon the determination of these two points. Besides, supposing these points established, they prove nothing, for the deceased may have cut with the left hand, in which case the direction of the wound would be precisely the reverse of that just described; and there are many other accidental circumstances which may interfere with the correctness of any generalization.

Moreover, it is but rarely that the wound in the throat has a perfectly horizontal direction (Cases CLXVI., CLXVII., CLXXII., and CLXXIII., CLXXVI., and CLXXVII.), and this makes it more difficult to distinguish the commencement from the termination of the incision. Finally, it is precisely in the case of wounds of the throat that cases often occur, in which the destruction of parts by bold and deep incisions is so fearful, that the medical jurist is perfectly unable to satisfy himself or make clear to others in the protocol, the original direction of the wound, the evidence of this being also materially altered by the retraction of the muscles, and the manipulation of the body in taking off the clothes, during the carriage, &c. When after all this, the peculiar combination of circumstances of the individual case is not sufficient to make its nature perfectly clear, it only remains for the medical jurist so to frame his opinion as to express the great probability of the death being due either to suicide or homicide; or, if even this be impossible, then he must so frame it that even in its apparent uncertainty, it is yet distinct enough to give the judge a hint for the further treatment of the case, and for the investigation of other evidence, which he on his part has to collect, for instance:—"The examination of the body has not revealed any circumstances inconsistent with the supposition that the deceased has died by his own hand;" this form of opinion we have already repeatedly recommended for similar cases, and we very often employ it.

§ 24. Illustrative Cases.

Case CLXIII.—Doubtful Suicide.—Wound of the Carotid Artery and Jugular Vein.

The body of a man with his throat cut was found clothed and standing up to the middle in a marsh. The trachea, œsophagus, left carotid artery, and jugular vein were completely divided! Of course, the anæmia of the body was general, except, however, the cerebral veins, which took no share in it, being visibly well filled. The soles of the feet and palms of the hands were bluish-white, and completely corrugated, like the hands of washerwomen who have just been washing, a condition which is always present in bodies that have lain any time in the water. The cap of the deceased lay on the bank, and there was money in his purse. The fact of suicide was in this case indubitable, and a complex mode of death had been selected, evidently in the hope of sinking in the water should the cut in the throat not produce a rapid enough end, a procedure often adopted by those weary of life, in order to make sure of attaining their object.

CASE CLXIV. — DOUBTFUL SUICIDE.—WOUND OF THE JUGULAR VEIN.

The following case of doubtful suicide of a hat manufacturer, who was also found dead, with his throat cut, was much more difficult to unravel. This man was heard walking up and down in his room till far on in the night, and the next morning he was found lying dead on the floor opposite the looking-glass, with his shirt, boots and trousers on, and a silk neckerchief round his neck. Everything around was smeared with blood; about two feet from the body there lay a bloody razor, *shut*, which was amissing from a razor-case standing open in the window. A short distance off there lay a mass of recent human ordure. These circumstances, particularly the fact of there being two superficial wounds at the bends of both elbows, whilst *the sleeves of the shirt covered both of the arms*, finally, the relations in which the deceased lived, with *two* concubines, had raised the suspicions of murder. Death had been caused by a wound of the throat, which ran obliquely across it downwards from left to right (the neckerchief being uninjured), and had cut across the larynx and both of the external jugular veins, and so produced death by hæmorrhage, as was abundantly evidenced by the bloodless condition of the whole body (except the cerebral veins, which still visibly contained blood). Several remarkable pathological appearances were also found, which facilitated our decision regarding the case. The cartilages of the larynx, almost the whole of the trachea, and even the bronchi, were ossified, the latter contained pus; the heart was hypertrophied to one-half larger than usual, its left ventricle was dilated, and the liver was cirrhotic. These complaints, as was proved by medical certificate and the evidence of those who lived with him, had rendered the deceased for many years very ailing and depressed in spirits, and so late as the evening before his death he was heard to say, "only a pistol bullet, and all is over!" Whilst all these circumstances pointed to the probability of suicide, this was strengthened by the fact that the door of the room was *bolted on the inside.* The only remarkable points were the incisions on the arms, and the fact of the razor being shut, and upon these points we expressed ourselves as follows:—"These wounds must have been first inflicted, since it is not to be supposed that any man after having given himself such a gash in the throat could still give himself two wounds in the arms. It is also just as impossible to perceive why any murderer, after cutting the throat, should then proceed to wound the arms in the manner discovered, as it is to suppose that a third party could *first* inflict these trifling wounds and afterwards the fatal injury. It is well known, however, how often suicides make fruitless attempts before they attain their end. It is extremely probable that H. has acted in this manner, and that he in the first place made these superficial incisions, which, as they were but slight, left him all his senses, and ample time to draw down his shirt sleeves and adopt another and more certain mode of death. It is also a striking fact that the bloody razor was found lying near the body, *shut*. But there is nothing in the circumstances of the case to render this occurrence irreconcilable with the fact of suicide. Since it is consonant with experience to suppose that death from the wound in the throat was not instantaneous, but rather that the deceased, in accordance with what has happened in other cases which have been under medical observation, indubitably lived for several minutes at least, perhaps longer, and may very easily, immediately after making the incision, have shut the razor and flung it away. However remarkable the uninjured condition of the neckerchief may appear, this also speaks more for suicide than murder, since it is scarcely to be supposed that any murderer, even if he had fallen upon H. when asleep, would proceed to work so carefully and leisurely as first to pull down the neckerchief. Finally, it is difficult to suppose that the situation in which the body was found was purely accidental, but the supposition is rather forced upon us, that H. purposely selected this situation, and standing opposite the looking-glass, drew down his neckcloth and made the fatal incision." These views prevailed, and the fact of the suicide was distinctly proved by subsequent investigation.

CASE CLXV.—DOUBTFUL SUICIDE.—WOUND OF THE CAROTID ARTERY AND JUGULAR VEIN.

In another case of fatal wound of the throat, in which the left carotid artery and jugular vein were cut across, we found several very interesting pathological appearances, betokening much prolonged suffering, and which had indubitably been the cause of the suicide.

The heart was unusually small, and yet its left side was hypertrophied. The stomach was almost vertical in relation to the pelvis, and was very distinctly divided *into three pouches* by two strictures, the whole of its mucous membrane was also thickened. The right kidney, its artery and vein were completely wanting. The cause of death was hæmorrhage, of course, evinced by the general absence of blood, except from the *sinus duræ matris,* which were still tolerably well filled.

CASE CLXVI.—MARK OF STRANGULATION AND WOUND OF THE THROAT.—WOUND OF THE CAROTID ARTERY, JUGULAR VEIN, AND TRACHEA.

The case of a man, aged 60, formerly a Government official, and who was stated to have lost his property by speculating on the Stock Exchange, presented a very peculiar complication. We saw the body, previous to the autopsy, lying on its back in the kitchen. Both hands were much besmeared with blood. On the neck a gaping wound, with somewhat obtuse edges, stretched perfectly *horizontally* from one ear to the other; there was no ecchymosis surrounding it; it afterwards appeared, that this incision had cut across the anterior wall of the trachea immediately beneath the larynx, the right jugular vein, and the anterior wall of the carotid. Three parallel, dark bluish-red stripes, not ecchymosed, and each a line in breadth, coursed round the neck, and were lost at each angle of the incision. At the right angle of the wound there was an actual extravasation of blood beneath the stripes. Close beneath the lower edge of the wound in the throat, a portion of just such another stripe could be distinctly perceived. The anæmia of all the three cavities was very remarkable. Two inches above its bifurcation the abdominal aorta was very much ossified. We declared that the autopsy had revealed nothing inconsistent with the supposition that the deceased had died by his own hand, that even the mark of the cord round the neck, in the absence of every injury to the clothing or wound of the body, was not incompatible with the supposition, but that it rather only afforded a fresh proof of the stability of the suicidal purpose; that the attempt at hanging must have taken place some time before death (since an ecchymosis had actually occurred), that the notched and bloody razor found might have been the fatal weapon; and finally, from the circumstance that the clothes were much stained with blood only posteriorly, we stated it to be likely that the deceased had cut his throat either when lying or sitting. All these suppositions, particularly that respecting the attempt of strangulation having occurred sometime before death, were subsequently completely confirmed, since a relative stated, that on coming home the day previous to the suicide, he found the deceased lying strangled and senseless, and was fortunate enough to rescue him at that time. The following night, however, he went into the kitchen and killed himself by cutting his throat.

CASE CLXVII.—WOUND OF THE THROAT.—DEATH FROM SUFFOCATION, AND NOT FROM HÆMORRHAGE.

The very heading of this case is sufficient to justify its relation as something altogether unusual, or rather extremely rare. A man, aged 60, very much given to drink, and who had been desponding for months, was heard one morning breathing heavily in his room. On entering this he was found sitting close to the entrance door, breathing stertorously and dying. A few feet from the chair, close in front of a night-stool, over which hung a looking-glass, there was a very considerable pool of blood on the floor, and one foot from it there lay an old, rusty, blood-stained, notched, and blunt razor. An incision ran horizontally across the neck, distinctly beginning at the left side, where several superficial wounds showed that several commencements had been made. It was at once evident, even on external inspection, that the incision had not reached the larger blood-vessels; and this was subsequently confirmed, but the trachea was completely divided beneath the larynx. The supposition that the man had not died from hæmorrhage, founded upon the fact that there was but comparatively little blood effused in the room, that the man's clothes were but little stained with blood, and that he could move about and sit down, was also confirmed. For the lungs were not anæmic, but very œdematous; the left side of the heart contained much blood, and the right one was unusually congested with coagulated blood of an inky hue, with which also the pulmonary artery was completely stuffed. The trachea was empty and quite normal. There was no anæmia either in the head or abdomen; the *vena cava inferior* contained, indeed, much dark blood, and the kidneys, completely imbedded in fat, were hyperæmic. The death consequently resulted from lexy of the heart (asphyxia), caused by the impossibility of main- respiration by reason of the amputation of the larynx.

CASES CLXVIII. TO CLXXI.—MURDER AND SUICIDE BY WOUNDS OF THE CAROTID ARTERIES, THE JUGULAR VEINS AND THE TRACHEA, AND ALSO BY CRANIAL INJURIES.—SURVIVORSHIP.

The following horrible scene was the most repulsive I have ever witnessed, though of course I have often been present at the judicial removal of the bodies of those that have met a violent death. One night in October, the neighbours heard a great noise and screaming in the small dwelling of a subaltern official, and those in its immediate vicinity had heard cries for help coming from the window, but not till the morning was it discovered what had happened. The husband and father was known to be a passionate man, but bore an otherwise good character, particularly in his official position. It seemed, therefore, wholly inexplicable and mysterious, when, next morning, none of the family appearing, the house was broken open, and in the little kitchen—the whole family of husband, wife, and two boys were found lying dead upon the floor, all lacerated and besmeared with blood! The bed of the husband alone had not been slept in, the other three beds had all been occupied. The mother and her children lay upon their backs on the floor, close to one another, with here and there a leg or an arm lying upon the body adjoining; the sons were in their shirts, the mother in her night-dress! The body of the father was clad in a sheepskin coat and trousers, and lay on its face, with its head within the room in which his bed lay. Large pools of blood lay scattered over the kitchen, and on the floor there lay an unusually heavy kitchen axe, an old sabre, and a razor, all of them besmeared with blood. At the first glance the bodies were seen to be much cut and hacked! How could this have happened? This was not likely to be a case of burglary, for nothing was wanting, no press was broken into, &c. The murderer of the family must, therefore, be sought for within itself, and the most natural supposition was, that the father, a powerful man of forty years of age, had first murdered his wife and children, and then committed suicide. But no one who knew the family and their habits was aware of any motive that could lead to such a crime; or was it possible, that the mother, likewise a powerful woman, of just thirty years of age, had killed first her husband and children, and then herself? A medico-legal examination of the four bodies was ordered and was carried out by us. To save space, we shall only describe the various wounds summarily, omitting the exact description and correct measurements, &c., of the original protocol, and shall merely narrate the more important appearances found, as this will suffice for our present purpose.

(CLXVIII.)—THE MOTHER.—The whole of the scalp covering the right side of the head was much mangled, the skull-bones were smashed and mingled with the protruding brain; the face was swollen and ecchymosed. On the front of the neck there was a clean cut, three inches and a-half long, which had completely divided the trachea and both carotids. Beneath the right mamma there was a smooth-edged gaping wound, one inch and a-half long, which had penetrated the interior; further, upon the right thigh there was a somewhat triangular sharp-edged wound, one inch and a-quarter long; on the back of the neck there was an incised wound an inch and a-quarter long, and smaller punctured wounds on the right side of the abdomen and back, and on the right buttock, as well as "many isolated, livid, but not ecchymosed spots, particularly on the abdomen, which cannot be more accurately described." In the skull it was found that the right parietal and temporal bones, the occipital bone, and the left side of the frontal bone had been smashed; on the right cerebral hemisphere there was a thick layer of dark coagulated blood, which also extended down over the base of the skull, which was "completely split into two halves." In the right lobe of the liver, there was a punctured wound an inch long, and there also existed incomplete general anæmia. It was not difficult to decide that the wounds of the throat and neck had been inflicted with some sharp cutting instrument, the cranial injuries with some blunt and heavy weapon wielded with great force, that all the other wounds had been made by some stabbing instrument, and that the razor, axe, and sabre, the latter having a very sharp point, already referred to, must have been the weapons used. In answer to a question, we also stated, that the cranial injuries, irrespective of all the other wounds, completely excluded the idea of suicide; that it was to be supposed that the cranial injuries had been inflicted before the throat was cut (both carotids divided!), and that several of the smaller wounds (superficial punctures and excoriations) were inflicted after death.

(CLXIX.)—AUGUST, *a son, aged* 10 *years.*—The right ear was completely cut in pieces by sharp-edged wounds; two similar wounds were upon the head, a third upon the left forehead, and the whole of the left cheek was cut in two by a precisely similar wound; on the anterior part of the neck there was another wound two inches and a-half long, and on the breast, and above and below the umbilicus there were three punctured wounds. The whole of the right side of the skull was smashed, and the corresponding cerebral hemisphere covered with a layer of coagulated blood, the left side of the frontal bone was fractured, and the whole base of the skull smashed. The anterior wall of the trachea and of the left carotid were cut through. There was a punctured wound in the lower lobe of the right lung, with effusion of blood; a punctured wound through the centre of the diaphragm on the right side, through which a part of the liver had passed; a punctured wound in the inferior surface of the right lobe of the liver; a punctured wound through a coil of intestine, with escape of fæcal matter, and general anæmia. The opinion arrived at was much the same as that in regard to the body of the mother.

(CLXX.)—*The other son,* WILLIAM, *aged* 8 *years,* was also murdered after a similar blood-thirsty fashion. At the umbilicus there was a semicircular skin-wound; a similar wound in the pit of the stomach, which penetrated the abdominal cavity, and through which the omentum was prolapsed, and two other similar wounds on the left side of the thorax. Two parallel contused wounds passed across the face from the middle of the forehead towards the left ear. There were two other contused wounds upon the vertex and upon the left parietal bone; a smooth-edged incised wound on the anterior part of the neck met another similar one running from behind forwards, so that there was only an isthmus of skin about two inches broad left uninjured in the middle of the neck. This wound, after dividing the cervical vertebræ, had wounded the spinal cord. It was thus a regular attempt at beheading! At the dissection the whole of the skull, its vault right and left, and its base, was found to be completely smashed; there was a penetrating wound of the brain on the right side, and a great effusion of dark coagulated blood into the cranial cavity. On the neck the great lateral vessels were in this case uninjured, as were also the œsophagus and trachea, but the second cervical vertebra was completely divided from the third. There was a punctured wound in the lower lobe of the left lung, with effusion of fluid blood; a punctured wound of the left half of the diaphragm with prolapsus of the stomach, the latter organ had also a punctured wound in its posterior wall. General anæmia of the body was of course present. Irrespective of our opinion as to the weapons employed in this case, which was of course the same with that delivered in the case of the other two bodies, we explained, that in this case also the cranial injuries must have preceded the wounds of the neck, and that the injuries on the breast and belly must have been inflicted after death; and in stating this we were guided not so much by the condition of the edges of the wounds, or by the fluidity of the blood in the latter instances, and its coagulation in the head, for upon these points alone I would have placed but little value (*Vid.* Vol. I., pp. 25 and 118), as by the peculiar combination of all the wounds when viewed as a whole.—Finally,

(CLXXI.)—*The body of the* FATHER. — There were post-mortem stains upon the breast, from the prone position in which the body was found lying. The right hand *alone* was very much besmeared with blood. About the middle of the belly there was a gaping wound thirteen inches long, its edges tolerably sharp, yet somewhat zigzag, and feebly ecchymosed. "The whole of the neck was cut through round and round, and three different wounds can be distinctly made out, of which the first has divided the right side of the neck, the second the back part of the neck, and the third its left side." All the three wounds had very sharp and smooth unecchymosed edges, the jugular veins on both sides were cut across, all the other important organs in the neck were uninjured. I have only to add, that the abdominal wound was not a penetrating one, that everything else was normal and uninjured, and that anæmia was the cause of death. We explained that the hæmorrhage had taken place from the wound in the neck, that this had been made with the razor already mentioned or some similar weapon, that the wound in the belly must have been made before death, and that the case was evidently one of suicide. The presiding Judge felt himself necessitated to inquire *which of the two parents had died first?* and he was answered, *that the husband had died subsequently to the wife.* For the skull and brain of the latter were completely smashed, the base of her skull broken in two, and a very considerable effusion of blood into its cavity; both of her carotid arteries were also completely divided, and she also had a wound in her liver, while her husband had only his jugular veins cut; and, even supposing that these injuries had been inflicted upon these two individuals simultaneously by a third party, it must of necessity be presumed that such an unusual accumulation of important injuries must have killed the woman long before the man would die from venous hæmorrhage alone. But the totality of this fearful case led rather to the conclusion that the husband had *first* murdered his wife and children, and *then* committed suicide. It was ascertained that the man had returned home late at night, whether drunk or not (he was no drunkard) is unknown. A quarrel then arose between himself and his wife, which must speedily have become very violent, and led to blows, wakening the sleeping boys, and leading them to run to their mother's assistance, since it was a child's voice that was heard calling over the window for help. And now the brute-like rage of the man seems to have been excited to the utmost, and one after the other seems to have fallen slaughtered beneath it. Evidently, he had at first used the heavy kitchen axe alone, and struck with it in frantic rage upon the heads of his victims, and when they had fallen helpless beneath its blows he had cut their throats with the razor while they were yet alive, finishing off by slashing and stabbing them in blind fury with the sabre when dying, and their bodies after death. The position of the bodies, which we have already shortly described, the extremity of one being laid over another, proved indubitably that he must have meddled with the bodies! One circumstance is, however, remarkable. In the case of the mother and the eldest son the contused wounds of the head were chiefly on the *right* side of the head instead of, as usual, on the left, and yet it did not appear that the man had been "left-handed," since he had evidently made use of his *right* hand alone to cut the throats of his victims, as was proved by its being the only bloody one. Consequently, we were compelled to regard these contused wounds as having been inflicted from behind, probably while the unfortunates were fleeing from him. The nature of the wounds on the neck of the miscreant himself, being the only fatal wounds upon him, quite distinctly proved his suicide, since no third party could inflict such *annular and threefold gashes* on the neck of so robust a man without invoking his personal resistance, and yet of this there was no trace upon the body. Evidently, he had, after finishing his bloody work, attempted to kill himself by making an incision in his belly; and it is a remarkable psychological fact, that the same man, who just before had, with the utmost possible fury and personal exertion, so horribly mutilated his family, had (undoubtedly) immediately thereafter laid hands *on himself* with so feeble a resolution that he only succeeded in cutting the skin of his belly!! He then seized the razor—which at the examination we found all notched and jagged. Verily it had done terrible work!!

[illegible] II.—MURDER BY CUTTING THE THROAT. [illegible] OF THE TRACHEA AND THE CAROTID.

[illegible] a father cut the throat of his own [illegible] Paul, aged 3½ years, and Oscar, aged 1½ year, [illegible] thereafter made several unsuccessful attempts to com-[illegible] hanging himself. The wounded children [illegible] were examined by us three days subsequently.

[illegible] The body of PAUL was not waxy in hue, but presented [illegible] appearance. On the neck there was a clean incised [illegible] long, and gaping to the extent of two inches; its [illegible] ecchymosed, and its direction was perfectly [illegible] The trachea was smoothly and completely cut through [illegible] the left carotid artery was also completely [illegible] the œsophagus was perfectly uninjured. The body was [illegible] excepting a hypostatic congestion of the posterior [illegible]

[illegible] The body of OSCAR was of a dirty pale-green (waxy) [illegible] The wound of the neck, which was *horizontal* in this case [illegible] and a-quarter long, and its lips were two inches [illegible] The edges of the wound were sharp, smooth, dry, and *not* [illegible] In this case, also, the trachea was cleanly and smoothly [illegible] from the larynx, while the œsophagus was uninjured. This [illegible] large blood-vessel wounded, but the body was, neverthe-[illegible] anæmic, with the exception of the sinuses of the [illegible], which were moderately filled. The decision respecting [illegible] was, of course, very easy to arrive at. The horrible deed [illegible] been committed shortly after a meal, since the stomachs [illegible] children were quite full of potato-soup. We concluded, from [illegible] direction of the wound, that the father must have had [illegible] standing before him (like a bass fiddle) when he committed [illegible] The unfortunate, melancholic, and mentally diseased man, [illegible] both of these statements immediately after the completion [illegible]

CASES CLXXIV. AND CLXXV.—MURDER BY WOUND OF THE THROAT.—WOUND OF THE CAROTID ARTERY, JUGULAR VEIN AND TRACHEA.

Two cases, precisely similar to the foregoing ones, psychologically and traumatically, occurred among the children of an upholsterer, S., who, being mentally diseased, had cut their throats with a razor, one morning while they lay in bed; the two daughters immediately bled to death, while the two boys survived, and from them we learned that all the children had defended themselves against their father, which could also be partly made out from the nature of the injuries.

(CLXXIV.)—*The body of* LOUISA, aged 7, was of a waxy hue, but had post-mortem stains, and on the left side of the neck an almost rectangular skin-wound, and beneath it the fatal injury, which ran from left to right, and somewhat from above downwards, and had completely severed the carotid artery, the jugular vein, and the trachea beneath the larynx. There was general anæmia.

(CLXXV.)—*The body of her* SISTER, aged 4, was also of a waxy hue, and had also post-mortem stains. On the left side of the neck there was a wide gaping wound, two inches and a-half long, also running from left to right and from above downwards. The left jugular vein and its anterior wall cut across, and the anterior wall of the trachea was also divided. There was general anæmia. The self-defence of the unfortunate children was proved by the existence on the youngest boy, aged 9 years, of (at the time of my examination) cicatrized wounds at the right angle of the mouth, and on the four fingers of the right hand; the wound on the neck was on the left side and cicatrized; his brother, aged 10 years, had two small cicatrices of wounds upon two fingers of his left hand; the wound on his neck was on the right side, somewhat arched, and already cicatrizing; close beneath it there was a similar wound, more horizontal, and two inches and a-quarter long. It is remarkable that the wound in both the girls had precisely the direction usually found in cases of suicide. In answer to a question put to us at the time of the autopsy regarding the probable position of the perpetrator, we explained that most probably he must have stood behind the children as they lay in bed, and the testimony of the surviving children subsequently confirmed this.

The youngest boy died five weeks afterwards in the Hospital, whither he had been sent for the cure of his wounds, and his body was also ordered to be medico-legally examined. The wounds on the neck were completely cicatrized. Both pleural cavities were distended with serous fluid, and the right lung slightly adherent. Both the lungs, as well as all the other thoracic organs, were quite healthy. In the abdomen, also, there was a large amount of a similar exudation, and also a small quantity at the base of the brain. There was, withal, no œdema of the feet, and no *decubitus*, so that the illness must have been of but short duration, and the effusion must have been very acute. Added to this, we had the kidneys very large, and their cortical substance was throughout distinctly violet from vascular injection, so that we were justified in suspecting, and, on interrogation, expressing our suspicion that the child had died from scarlet fever. Inquiry at the Hospital completely confirmed this supposition.

CASES CLXXVI. AND CLXXVII.—SUICIDE BY CUTTING THE THROAT.—DIVISION OF THE TRACHEA AND ŒSOPHAGUS.

Upon one and the same day we dissected the bodies of two men, one 21 years of age, and the other 50, both of whom were well known to have killed themselves by cutting their throats with a razor, the former three, and the latter two days previously. I relate these two cases now in connection with the foregoing ones, because, in the first place, although they were both indubitably cases of *suicide*, yet the wounds were perfectly *horizontal*, so that it was perfectly impossible to say where the wounds had commenced, and where they ended. Further, there was this peculiar circumstance in relation to the body of the older man, that even the hands had been washed before it came before us for examination, and in respect of the younger man, that his *left* hand was completely besmeared with blood, the right much less so; further, that the left hand was quite spasmodically contracted, the right not. These appearances induced us to suppose that the incision must have been made with the left hand, and this supposition was subsequently ascertained to be correct by the inquiries of the police. Both bodies had the usual post-mortem stains, which I have never found absent, even in cases of death from hæmorrhage as I have already stated (§ 8, p. 20). But the younger man's back was of a pure cadaverous white, and unstained, while there were post-mortem stains upon the belly, and on the anterior surface of the thighs, and a yellowish parchment-like patch upon the chin. From this we concluded, that in dying he must have fallen on his face and so remained lying. And in perfect agreement with this view we found the hypostasis of the veins of the *pia mater,* which were present in the bodies of both of these persons dead from hæmorrhage, and the hypostasis of both lungs situated *anteriorly,* thus forming a rare exception to the general rule. It was subsequently ascertained, that the body had actually been found lying upon its face upon a heap of rubbish. Neither suicide had divided any of the large cervical vessels, but both had cut across the trachea and œsophagus; the younger man through the middle of the larynx, the older man between the hyoid bone and the larynx. There was general anæmia of both bodies. Finally, the head of the junior alone was of a dirty-yellowish white, except this, however, neither body presented any peculiar appearance, but only the usual corpse colour.

CHAPTER II.

DEATH FROM STARVATION.

§ 25. GENERAL.—CASE OF STARVATION FOR TEN DAYS WITHOUT DEATH.

THERE is very little that is certain known respecting this kind of death. Hundreds of men have pined to death in dungeons, or shipwrecked, have been tossed up and down on a raft on the ocean, till they sunk, undrowned, beneath the ocean, &c.; all these have indubitably died from starvation; but who has observed them? The tolerably numerous cases related by the older authors of healthy men fasting for weeks, or months, or even years, are to be set aside as cases of intentional or unintentional deceit. And even the more rare clinical histories and reports of the dissection of cases said to be of death from starvation in more recent times, deserve but little confidence, since they date from an epoch in which the purely cadaveric phenomena, which are of great importance in such medico-legal cases, were neither known nor acknowledged, and further, because many of them are related by untrustworthy observers and mere bookmakers. In such a state of matters it says but little for the scientific good taste of even such men as Orfila, whose suppositions have found their way into other and newer text-books, to lay down such propositions as, that women succumb to starvation at a later period than men; that cold and damp permit of a longer abstinence from nourishment than warmth and drought, &c. Since a great many observations must have been necessary to enable such propositions to be laid down; and where are these observations? My own experience in this field has been extremely scanty, and relating the results of it now, I am very far from wishing to deduce from it any generally applicable axioms, but would rather leave that to be done by the science of the future. It is well known and certain that there are two kinds of death from starvation, the chronic and the acute. The former is brought about by the gradual withdrawal of all nourishing food, and the restriction of the diet to starvation pitch, whereby diseases of every kind, particularly atrophy and phthisis, are produced, and finally death from exhaustion follows (*Vid.* Chap. I. Vol. II.). The latter, the true death from starvation, ensues more rapidly upon the complete and total withdrawal of every article of nourishment. Since only completely isolated cases could afford any correct criterion for deciding how long total abstinence might be borne before death occurred, it is readily explicable how the opinions of authors have varied within so wide a range that this term had been rated at from three to sixty days! The following case, of which I can at least say that I observed it with the deepest interest and complete impartiality, seems to justify the opinion that a powerful, healthy man is not *likely* to die in less than ten to twelve days of total abstinence from every article of nourishment, so that conversely, when death from starvation has occurred, we may thence deduce that starvation for at least so long a time has pre-occurred.

A healthy goldsmith, aged 36, had been, for fraud, condemned to imprisonment for more than seven years, against which he had appealed. Having been already in prison for more than a year, he made up his mind to starve himself, and on the morning of the 17th February, 18—, he commenced by leaving his breakfast untouched; at dinner he took a little (how much could not be exactly determined) of the ordinary thick vegetable pottage, which forms the prisoner's usual diet. On the morning of the 18th he took an allowance of soup, and thenceforth refused every nourishment. To my great grief, I did not become aware of the case before the 23rd, when my advice was requested; the two house-physicians having, up to that time, carefully observed the prisoner N., and well acquainted with the usual deceptions of prisoners, had endeavoured to guard against the possibility of any such deceit. In the first place, I could not but approve of the means taken to observe the conduct of N., and guard against his suicide, by placing with him in the cell two tolerably well-educated men, who were only in prison for some trifling police offence. On the forenoon of the 23rd, after he had already for five times four-and-twenty hours suffered *nothing* to cross his lips, I found him lying on the straw mattress. He appeared pale, yet not much different from those who have been in confinement as long as he; his features were, however, somewhat collapsed; his eye was dull, his bodily temperature perfectly normal, his tongue was covered with a white mucous coating, and in speaking there was a distinct clacking of the tough mucus in the mouth to be heard. The tone of his voice was not hollow, and no bad smell was perceptible coming from [illegible] was [illegible] him [illegible] and [illegible] have made [illegible] take [illegible] On the 24th, his [illegible] had forced him to take [illegible] On the 25th, there was still no [illegible] It was Sunday, and the house-chaplain [illegible] the Sacrament of the Lord's Supper, but this [illegible] stated that he had vowed to God to eat [illegible] come what may. When I asked him whether [illegible] his friends he would then begin and eat, he [illegible] sure. At that very time his Sunday dinner, [illegible] stood steaming untouched beside him. N. [illegible] evidently becoming thinner. He cannot continue [illegible] because his sight fails him. The singing in [illegible] somewhat more frequent. His tongue is purplish-red [illegible] its edges somewhat dry, and the mucus covering it [illegible] than before, and produces still more clacking than [illegible] smell is also now perceived to come from his [illegible] doughy-feel of his belly recalled to my memory that of [illegible] patient. His skin is slightly moist, the perspiration [illegible] ; for twenty-four hours he has passed no urine; he has [illegible] any fæcal evacuation, his pulse is as formerly, his mental [illegible] undisturbed. He has now fasted for *seven* days. On [illegible] N. has passed a little concentrated dark-coloured urine, [illegible] however, no longer go himself to the night-stool for this pur[illegible] but must be carried. His voice has now assumed the hollow [illegible] so commonly observed in abdominal diseases. The pulse is [illegible] quickened to 96, the tongue moister, otherwise his state is as [illegible] day. In the absence of every alarming symptom, I could not [illegible] asking myself how long might this still unendangered life yet [illegible] obstinately to prolong its existence? There was certainly no good reason to doubt the possibility of N. yet living eight days longer at least. On the 27th, I found his bread and other sustenance still untouched. N., who was constantly watched by his fellow-prisoners, no longer felt any hunger, but only a necessity to moisten his dry and clammy mouth, which he has done since yesterday morning with pure cold water, without swallowing any. His belly seems very hollow. He has not the slightest call to stool, and has had no feeling of nausea, choking, vomiting, or pain. His head, however, feels "stupid," and very heavy when he attempts to raise it. The smell from his mouth is now more distinct. The day of the 28th was a remarkable one. The pulse was only 76, and very feeble. Early in the morning N. had complained of double vision, and from time to time of spasms of the stomach, which were relieved by strong pressure. Yesterday afternoon and this morning early, he had from absolute necessity now and then taken a little sugar-and-water, and used in all about six ounces. He says he has no hunger, and he has not eaten anything. On the other hand he asserts, that everything to-day smells of milk, and in the night between this day and the 29th, hunger suddenly seized and overpowered him, and he ate a little of yesterday's allowance of bread which still lay near his bed. Founding on his yesterday's intimation, half-a-pint of milk was given him this morning (29th), and he consumed it. Soon afterwards I saw him, and with his own consent ordered some gruel with milk to be prepared for him, and this he took greedily, and henceforth he continued to take his regular meals daily. He was put upon the full diet of the Prison Hospital. Two months afterwards I saw him perfectly healthy, and in his pristine good condition. He assured me that he only experienced hunger during the first three days. Afterwards the "finest and best" of food would not have tempted him. The like has been noticed in all the other cases observed. It is remarkable that the "*appetite of smell*" persisted, was the first to re-awaken, and was directed to the simplest of nourishment, to ***milk***, the primitive food of all mankind.

The morbid phenomena we have just described, are substantially identical with those which have been related as having occurred in every other case of starvation observed. N.'s urine during his prolonged fast was examined at my request by my well-known colleague Mitscherlich. I was particularly desirous of knowing whether the urea were present or no. The urine, however, was not found to deviate from the normal, thereby confirming Lassaigne's statement, that urea is not wanting in the urine of the starved. I would most gladly have examined whether during the fast the colouring-matter and albumen of the blood had suffered any diminution, as Andral, Gavarret, and Fr. Simon, have, with great probability, supposed. But I did not consider the mere love of science a sufficient reason for subjecting any one so much reduced as the subject of my observation was, to the loss of even the most trifling quantity of blood.

§ 26. Continuation.—Diagnosis.

The circumstance that the hitherto recorded experience of death from starvation is far too scanty to permit the statement of any definite time within which it must occur, can never materially interfere with the medico-legal opinion to be arrived at in any given case. Since even in such cases, we repeat, we have to determine in every individual case, not that death from starvation *must have*, but that it *has occurred*. And for the determination of this point we must employ the phenomena observed during the period of starvation of the deceased, in every case in which we can ascertain them, and always the results of the dissection. The former of these will be found to be almost precisely such as we have just described them in the case given. Usually, but not in our case, the hunger, at first severely felt, gives place to a burning thirst. The body rapidly emaciates and the strength decreases *pari passu*. Faintings, delusions of the senses, and a feeling of giddiness, occur as consequences of the depressed vitality of the nervous system. All the evacuations become sluggish; nausea, choking, even vomiting of mucus or a little bile, eructations, and an ill smell from the mouth set in, and death follows under the signs of the greatest possible exhaustion. The bodies are described as extremely emaciated and completely anæmic, the stomach as quite empty, and sometimes as corroded by its own acid secretion (the "self-digestion" of the English, which is most probably only a cadaveric phenomenon), the stomach is further described as shrunk together, the intestines here and there contracted, perfectly empty or containing only isolated hardened fæcal masses, the coats of the intestines are attenuated to transparency, the gall-bladder distended with a dark viscid bile. It is self-evident that amid all these various vital and cadaveric phenomena there is scarcely one that can be declared to be quite specific and exclusively pertaining to death from starvavion, if we except the attenuation of the coats of the intestines.* It is, therefore, all the more necessary to establish in every case by careful investigation the negative proof of the absence of every other cause of death, as by this alone the matter may be cleared up in doubtful cases, as the following examples will sufficiently show.

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* This phenomenon was first observed by Donovan (Dub. Med. Press,

§ 27. Illustrative Cases.

Case CLXXVIII.—Actual death from Starvation.

Three-and-thirty years ago, being then a member of the Medical College of the province of Brandenburg, there came before us for our opinion an actual example of that rare and almost unheard-of cause of death, starvation; and I give it now, not from memory, but from the official protocol of the autopsy, which is lying before me. The accused, who had in the first instance been condemned to death, had appealed, and so occasioned the bringing of the case before us for our revision and decision. The culprit was a surgeon of the lowest class, whose license to practice did not include any cases requiring internal (medical) treatment; he had treated a woman by means of mercurial inunctions (at that time a favourite remedy), and that so carelessly that ankylosis of the jaws took place, and the unfortunate patient died of actual starvation! The dissection is most carefully narrated, and the following are the most important appearances observed:—The body was much emaciated. The lower jaw projected strongly in front of the upper one, and the application of great force only sufficed to separate the one from the other but a very short distance. Most of the teeth in both jaws were wanting. After an incision had been made from the angle of the mouth to the ear, it appeared that there were still six grinders in the lower jaw, which, however, were not vertical, but *horizontal* in direction. Four of these teeth were so loose that they could be easily extracted. In the upper jaw there were four teeth, three of which were also quite loose. In the neighbourhood of the third grinder on the right lower jaw the periosteum and mucous membrane were black-coloured, and the upper edge of the jaw-bone felt rough after the removal of the periosteum. The upper and lower jaws on the right side were firmly connected by an anormal, dense and strong membrane. On the left side this unnatural

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1848) during the Irish famine in 1847, and he holds it to be the most important sign of death from starvation.

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[illegible] to a less extent. The tongue was com-[illegible] the soft parts beneath it, with which it was so [illegible] mass that its point could no longer be elevated!! [illegible] the tongue, to the extent of one inch, was com-[illegible] mucous membrane, and the muscles lay quite [illegible] following were the appearances found internally:—The [illegible] so much contracted that its cavity scarce equalled in size [illegible] In other respects it was quite normal. It con-[illegible] tablespoonful of muddy yellowish fluid without any remark-[illegible] The small intestines were also so much contracted that [illegible] diameter was scarcely the half of what it usually is. They were [illegible] usual colour, as were also the large intestines, which were like-[illegible] much contracted. The whole intestinal tract was completely empty. The liver was pale and ill-coloured, very anæmic, and its [illegible] somewhat harder than usual; the gall-bladder was full of dark bile. The spleen was small, shrivelled, soft and anæmic, partially adherent to the peritoneum. The other abdominal organs were normal. In the thoracic and abdominal cavities, the only thing remarkable was anæmia; the small quantity of blood in the heart was thick and treacly. The case, therefore, was one of actual death from starvation, and the results of the dissection accurately agree with those reported to have been found in the few cases published. (I may remark by the way, that the careless surgeon was condemned to imprisonment, and his right to practice was wholly forfeited.)

CASE CLXXIX.—SUPPOSED DEATH FROM STARVATION.

A journeyman tailor, aged 48, was said to have been starved to death. The case was the common talk of the town, and formed, of course, a peg whereon to hang the most grandiloquent humanity speeches. At the medico-legal autopsy, the body was in truth extremely emaciated in appearance, but internally the cause of death was found to be hypertrophy of the heart, with thickening of the coats of the urinary bladder, while the stomach was *distended with potato soup!* Accordingly, we found that the deceased had died from internal disease, and not from starvation.

CASE CLXXX.—SUPPOSED DEATH OF A CHILD FROM STARVATION. EXHUMATION OF THE BODY AFTER TWELVE DAYS.

An illegitimate child, aged nine months, that had died on the 12th of May (temperature + 12 to 15 R. = 53·6 to 59 F.), was exhumed on the 24th of the same month, because a report had spread that the woman who dry-nursed it had starved it. The body, when delivered to us for examination, five days after the exhumation, lay in a pinewood coffin, clad in a shift and cotton winding-sheet. The countenance, the inferior extremities and the right fore-arm, were covered with mould; the eyes had run out. The smell was not yet the faint cheesy odour of bodies exhumed at a later date, but the prevalent stench was that of putrescence. The skin over the whole body, except the inferior extremities, was of a dark-green colour. The extreme degree of emaciation was most remarkable, not a trace of fat being to be seen even upon the omenta. There were no traces of injuries or other violence to be found. The cranial bones and *dura mater* were very pale and anæmic; there was hypostatic congestion of the veins of the *pia mater;* the brain, as usual, was transformed to a thick reddish pap; the sinuses were empty of blood. The lungs were quite pale, perfectly free of tubercles, and remarkably anæmic; the larger blood-vessels were not quite so empty of blood. Both the large cardiac arteries and the right ventricle contained a little blood, no ways remarkable in appearance; the left ventricle was empty. The trachea and œsophagus were also empty. The stomach—I omit any more particular account of the phenomena due to putrescence in the different organs—contained two tablespoonfuls of curdled milk. Liver, spleen, and kidneys were remarkably anæmic. The intestines were pale and quite empty; they presented no ulcerations, nor any other anormal appearance, and the mesenteric glands were also free from any such morbid phenomena. The urinary bladder was empty. We declared that the child had died from internal disease, and not from starvation, but that the disease might be assumed to have arisen from want of proper care and nourishment. Besides the data here given in justification of this view, I may state, that this child, which was 9 months old, measured only twenty-one inches and a-half, and that it had only one incisor tooth, on the point of cutting. Moreover, the centre of ossification in the femoral epiphysis (§ 97) measured only three lines in diameter. In the absence of every symptom of true phthisis, as purulent collections, &c., these signs of retarded growth could only be referred to a general wasting, dependant on insufficient nurture. Our opinion was fully confirmed by subsequent investigation, which ascertained, among other things, that a physician, one month before the child's death, had ordered it to be removed from its nurse, as she only allowed it one pint of bad milk in the day, for its sole nourishment.

CASE CLXXXI.—SUPPOSED DEATH FROM STARVATION.

An illegitimate female child, aged 5 months, that had been given out by its mother to be dry-nursed, died, after having been ill, and suffering for a long time, having particularly laboured under, according to the deposition of the surgeon in attendance, "protracted diarrhœa." Its nurse was accused of having starved the child, which had been previously healthy, and this occasioned the necessity for a medico-legal examination. The little body was much emaciated, and slightly chafed in the thoracic region. The meningeal vessels were unusually congested, and in the left cerebral hemisphere there was an extravasation of blood the size of a bean. All the sinuses were also congested with dark, tolerably fluid blood. The heart and lungs were very anæmic. The spleen and liver were pale, and also anæmic. The gall-bladder contained only a little bright-green, treacly bile. The stomach presented a well-marked example of gelatinous degeneration, it tore on the slightest touch, and permitted the escape of about two ounces of *milksops*. The intestines were perfectly empty; the kidneys and abdominal vessels were anæmic. These appearances justified us, as in the previous case, in giving as our opinion, that not starvation, but internal disease had been the cause of the child's death.

CASE CLXXXII.—DEATH FROM PROTRACTED STARVATION.

On the other hand, in the following case the autopsy proved the truth of the accusation, that deficient nourishment and inattention had caused the death of the child in question, aged 3 months. The body was very dirty and emaciated, and the skin on the extremities quite loose from the entire absence of subcutaneous fat, the *nates* and posterior surface of the thighs were of a bright-red, and partially eroded. There was general anæmia; the lungs healthy, not tuberculous; the stomach empty, but normal; the mesenteric glands were not particularly scrofulous; the large intestines contained no fæcal matter, and were unusually small in diameter; the centre of ossification in the femoral epiphysis measured three lines and a-half in diameter. The child had accordingly died from "marasmus," without that having any organic origin. The extraordinary dirty skin, and the inflamed and eroded patches upon it were sufficient proof that it had not been properly kept clean. The statement of the accused nurse that she had given the child every day one pint and a-half of good milk, and latterly, half a rusk forenoon and evening, was proved to be untrue by the results of the autopsy; since such an amount of nourishment was amply sufficient for a three-months' child, and under it a perfectly healthy child could not have atrophied. Moreover, the important phenomenon of contraction of the large intestine, in conjunction with what we have just stated, seemed to justify our opinion that the child had died of general marasmus, occasioned by want of proper attention and insufficient nourishment.

CHAPTER III.

[illegible]

STATUTORY REGULATIONS.

[illegible] [illegible].—If [illegible] maliciously administers to another [illegible] any noxious thing [illegible] so as to endanger the health, is [illegible] with imprisonment for not more than ten years. [illegible] bodily injury, the [illegible] years. Should the offence [illegible] imprisonment for [illegible] cases where the [illegible]

[illegible].—If any [illegible] poisons [illegible] or [illegible] or articles of merchandise [illegible] or [illegible] them with any substance [illegible] the health [illegible], whoever [illegible] articles [illegible] or mixed with substances [illegible], is to be punished with imprisonment [illegible] than [illegible] fifteen years. Should [illegible] in consequence of such an offence, capital [illegible]. Should the offence have been [illegible] by [illegible] resulted, [illegible] is to be punished by [illegible] months, and when any one has lost [illegible] such an offence, the sentence is to be imprisonment of not [illegible] more than ten years.

[illegible] [illegible].—A fine of fifty dollars [illegible], or imprisonment [illegible] than [illegible] is to be inflicted on [illegible] 2.) [illegible] prepares, sells, or dispenses [illegible] any poison or medicine [illegible] permission of the police, except in such cases as [illegible] circumstances, committed [illegible] 3. [illegible] 4. whoever, in the transport of poisonous substances [illegible] or in [illegible] of preparing or [illegible] for sale such substances, as [illegible], does not follow the regulations issued in regard to

CRIMINAL CODE, § 167.—*Should there be any suspicion that the deceased have died from poison, the physicians must analyze chemically any remains of the supposed poison that may be found, as well as any suspicious matters that may be found in the stomach and intestines, and in doing this the greatest care must be exercised by the Judge, to prevent the possibility of these solid and fluid matters being changed, and to maintain their identity beyond the possibility of a doubt. For this purpose, when the chemical analysis cannot be carried out in the presence of the Judge, these matters are to be officially sealed and delivered to the two experts, along with a judicial protocol, and they are to be returned in like manner.*

REGULATIONS OF 15TH NOVEMBER, 1858, § 15.—*Where there is any suspicion of poisoning, a double ligature must be placed round the lower part of the œsophagus and about the middle of the small intestines, and these viscera divided between the ligatures. The stomach and upper part of the small intestines is now to be taken out of the abdomen, and after a provisional anatomical inspection they are to be placed in a clean vessel of porcelain or glass, and delivered to the legal officials for their further disposal. The œsophagus, after having been ligatured close to the fauces, is to be cut across above the ligature, and placed in the vessel beside the stomach, after being anatomically inspected. Finally, other matters, as blood, urine, pieces of liver, spleen, &c., should there be any reason to suppose that traces of poison may be found in them, are to be removed from the body, placed in separate vessels and delivered to the legal officials for their further disposal.*

§ 28. DEFINITION OF THE TERM POISON, AND CLASSIFICATION OF POISONS.

In spite of the great progress made in chemistry and physiology, the doctrine of poisonings is still the weakest side of medical jurisprudence, both theoretically and practically. In regard to the first, the new Prussian penal code has in very simple and happy manner disposed of the difficulties in regard to the definition of the term "Poison," at least in so far as regards the interests of justice, with which alone forensic medicine has to do in this matter. Whether the substance reproduces itself in the body or no, whether it can be secretly administered or not, whether it is not also used as a remedy, and yet cannot to be struck out of the list of "poisons," &c.; whether, therefore, and finally, in any individual case it may not be disputed whether the substance administered is actually a poison; all this now-a-days requires no further consideration, if it be only determined that the substance administered is one "*fitted* to injure the health." This is the sole criterion indisputably common to every so-called poison without exception, and which applies alike to brandy and to arsenic, to poppy-heads and to phosphorus. Of course, *poisoning* is therefore that "offence" (§ 197 Penal Code), whereby any *such* substance "is intentionally administered to another," that is, whether it be applied externally, or given to be swallowed. However, there is still another difficulty which not unfrequently comes practically home to the medical jurist, particularly in cases of mere attempts to poison, which the injured party survives,—a matter of course of special interest in the eye of justice, and one which must come under medical cognition: I mean the question as to the *quantity* of poison administered, which very often coincides with the definition of the form (dilution, &c.) in which the poison has been administered. For instance, cases often enough occur in which sulphuric acid has been added to drinks or fluid messes. That sulphuric acid is a "poison" has never been disputed. But in this, as well as in every other poison, there is a limit to the dose beyond which it ceases to be a poison *in a medical point of view*. Should any attempt to poison be made with an acidulated fluid, composed of a few drops of sulphuric acid added to a quart, *a physician* neither can nor will call this feebly acid mixture "a poison," since he knows it can no longer act as such. In another case a similar mixture may be administered, but in a dilution so much stronger that any physician, who knows the taste and action of this acid, cannot but assume that the acid and corrosive nature of the fluid would render it quite impossible for the person intended to be injured to drink it out. The *Judge*, however, views these matters in another light. The accused, N., had poured concentrated sulphuric acid into a kettleful of coffee belonging to the woman, J. The coffee weighed nearly one pound (imp.), and the quantity of concentrated sulphuric acid found in it on analysis amounted to about twelve drachms and a-half (imp.), making thus a dilution of about the strength of 1 : 25. Such a mixture, we explained, would be extremely acid, and would, if taken at once, perhaps not kill, but would certainly be "fitted to injure the health," by producing inflammation of the mucous membrane of the stomach. But we felt bound also to take into consideration the fact that no man in his senses would swallow at one time one whole pound of decoction of coffee with twelve drachms of sulphuric acid, because, independent of the largeness of the quantity, its strongly acid and corrosive taste would be sufficient to induce him to desist from drinking such coffee. Taking this view of the matter, we explained "that the mixture analyzed *could not be considered* as poison or as a substance fitted to injure the health." At the subsequent jury trial, however, the public prosecutor, after a violent discussion with the advocate for the defence, took his stand upon my opinion as to the nature of concentrated sulphuric acid, setting aside any hypothetical views of the nature of the dilution in question, of course I could not but say that sulphuric acid was a "poison." On the other hand, the advocate for the defence maintained that the view of the public prosecutor was unjust, since the accused had not administered concentrated sulphuric acid, but only the coffee mixture. Similar cases have often come before us, particularly in regard to drugs, used as abortives. The view taken by the public prosecutor in the case just quoted is also that of our superior courts of law. The accused, L., had three times given her husband a decoction of a small quantity of stramonium seeds, whereby he remained uninjured, and L. was condemned "for intentionally producing bodily injury by 'poison.'" Her advocate pleaded the non-occurrence of any such bodily injury, and maintained, amongst other things, that it is not sufficient that the substance administered be poisonous in *quality*, but that it must also be proved that a *quantity* sufficient to produce death or bodily injury has been administered. The Royal Obertribunal, however, set aside these objections, and decided in regard to this point, that any such view is directly opposed to the definition of the term poison; that is, any substance which from its *quality* alone is fitted to injure the health; therefore, according to this view, the administration of *any amount of poison*, that is, of any substance of itself fitted to injure the health, adequately represents the crime intended in § 197, clause 1, of the Penal Code* (*vid.* § 197, p. 38, Vol. II.).

Taught by the case we have just related, I have in every similar subsequent one, after detailing the various physical and medical points, contented myself with declaring the substance administered to be in itself "a poison," leaving the decision of the question of dilution for the judgment of the court.†

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* Archiv für Preuss. Strafrecht, iv. 6, s. 842.

† How little unanimity there is among those learned in the law, in regard to whether the administration of *any* quantity of poison is to be regarded as

The problem of an efficient classification of poisons has long seemed incapable of solution. And, although this is of no consequence in forensic practice, since in that,—particularly now that the new penal code has been published,—we have always only the one individual case to deal with, yet the requirements of science must always be striving after a general classification. But there is no denying that we do not possess a sufficient amount of facts for the construction of any such arrangement. In place of this we are constrained to employ the reactions of the poisons on the living body (the pathological phenomena) and the appearances found on dissection. I do not mean to say that a sufficient amount of clinical histories and records of dissections of poisoning of every kind, have not been collected, on which to base a scientific classification; there is quantity enough, no doubt, of such materials, accumulated in toxicologies, magazines, and judicial records; but, alas! the quality of these materials is not scientifically good enough for this object; hundreds of thousands of those dead of cholera have been carefully and scientifically observed and watched from the very commencement of the disease, and yet the disease is just as obscure as ever. On the other hand, amid the very much less numerous known cases of poisoning which have occurred, a large number have never been seen during life at all, or, what is all the same, have been only superficially observed by non-professional persons, or only seen by medical men at a later period, and towards the close of the disease; and to this we have to add the difference of symptoms which arise from the same poison having been given in one case in solution, in another enveloped in gruel or peas-porridge; in one case in a concentrated form, in another clandestinely in small and repeated doses, from antidotes having been used in one case and not in another. Hence, the rarity and insufficience of the exact scientific observation of the whole clinical history of a case of poisoning. In respect to the basis which a sufficient material of good histories of dissection might give, we must remember that most of these date from a time when purely cadaveric phenomena were not known or recognised as such, this having been reserved for our own day, and, even in it, due regard to this point is paid by but few physicians and medical jurists; and that further, in estimating the phenomena observed in dissections after death by poison in individual cases, appearances peculiar to the case,

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a punishable attempt to poison, is proved both by what we have stated above and also by the treatise of the Judicial Assessor, Dalke, on this subject, in the Archiv für Preuss. Strafr. 1858, vi. 4, s. 456.

and wholly unconnected with the actual effects of the poison, have but seldom met with proper attention. Hence the most confusing and opposite opinions, and the total want of agreement to be found, when we take the trouble, as I have done, to examine critically innumerable reports of the dissections of persons poisoned, both in former and in recent times. In one case we find blue or livid stains on the body mentioned, which have not been further examined, but were, indubitably, only the usual post-mortem stains; and forthwith the compilers have assumed livid stains to be one of the post-mortem proofs of a poisoning of the character in question! In another, after poisoning with hydrocyanic acid, livid venous cords have been seen coursing over the external surface of the stomach, and in the report of the dissection we find these "stases" made of some importance, and no suspicion entertained that this appearance is merely one of the ordinary phenomena of putrescence. In a case of chronic poisoning a flabby heart, a large spleen, and a very small contracted stomach have been found, and conclusions have been drawn from these appearances, which, after all, were most probably purely individual and perfectly independent of the poisoning.

§ 29. Continuation.

In spite of this deficiency, which cannot as yet be remedied, we must confess that any classification of poisons, to be useful, can only be based upon pathological and pathologico-anatomical phenomena, since to classify poisons, as the ancients did, into mineral, vegetable, and animal may be useful enough for school-children, but not for science, and a perfectly general division of them into organic and inorganic is from its very generality useless. But to the only useful criteria there is this important objection, that the actual and characteristic action of each poison is almost wholly unknown, that toxicology has only very recently laid the foundation of a truly scientific doctrine, in recognising the passage of the poison into the blood and its chemical relations to the solids and fluids, &c., and that if we must confine ourselves to the action of poisons as exhibited in their external phenomena, these are well known to vary very considerably, according to the difference in dose, the different preparations, state of oxidation, &c., of the same poison, which must therefore be included in sundry different categories. We do not require to wander far in search of examples, since the commonest poisons supply these. Mineral acids, sulphuric acid, diluted, or in a moderate dose, produces only a slight inflammation of the mucous membrane of the stomach, or if more aggravated, superficial excoriations; but when taken in a concentrated form and in large doses, they produce rapid gangrenous disorganization of all the coats of the stomach, &c., phenomena which are peculiar to these acids, and would justify their being made to constitute a distinct class of poisons by themselves. Bichloride of mercury is a perfectly different poison from mercurial fumes, as exhibited in the phenomena observed during life and after death; acetate of lead is quite different from the fumes of lead, oxide of zinc from chloride of zinc, while the compounds of mercury with sulphur can scarcely be reckoned as mercurial preparations at all in respect of their poisonous action, &c.

The following classification does not pretend to be sufficient to meet all these objections; and we ourselves set no particular value upon it, since our only object in labouring in the field of medical jurisprudence is the attainment of practical utility, and for this, as we have already stated, any classification is unnecessary. We classify poisons into—

(1.) IRRITANT POISONS, poisons which irritate and inflame; they produce primarily irritation, which may pass into inflammation and all its consequences, ulceration, gangrene, disorganization of the skin or mucous surfaces, with which they come in contact, and consecutively, most probably, as is already acknowledged in the case of many of them, by blood-poisoning (dysæmia), irritation of the nervous system. To this class belong the following poisons which occur in practice: the mineral acids, the preparations of arsenic, mercurial preparations (except mercurial fumes and the compound of mercury with sulphur), poisonous preparations of zinc and antimony, oxalic acid, caustic potass and soda, chromate and bichromate of potass, phosphorus, ætherial oils, colchicum, colocynth, gamboge and croton oil, the poisonous fungi, and cantharides.

(2.) POISONS WHICH PRODUCE HYPERÆMIA, narcotic poisons; these prove fatal by sanguineous congestion of the brain, lungs, heart or spinal marrow; and this action, which is uniform in poisons of this class, permits of a most simple explanation of all the phenomena observed during life or after death. To this category belong all the rations of opium, belladonna, nux vomica, strychnine, veratrine, e, hyoscyamus, conium, cicuta, digitalis, stramonium, tobacco, as well as their respective alkaloids, all the irrespireable gases and alcohol.

(3.) NERVE-PARALYZING POISONS.—These operate fatally by paralyzing the central organs of the nervous system, by poisoning the blood; hence the instantaneous death or death ushered in by the primary occurrence of paralysis or spasm, and the more or less negative results of the dissection. In this class we include hydrocyanic acid, cyanide of potassium, that oil of bitter almonds which contains hydrocyanic acid (only this one), cyanide of zinc, of lead, of copper, of silver, of kobalt and of chromium, ergot (?) and chloroform.

(4.) POISONS WHICH PRODUCE MARASMUS.—These usually occur in the form of chronic poisonings, and fatally ruin the health by slowly, but certainly, and seriously undermining and injuring the digestion, thereby inducing defective nutrition of the body, extreme emaciation, consecutive phenomena attributable to paralysis of the nerves, and hectic fever. In this category we reckon white bismuth, white-lead, the fumes of lead, mercury and arsenic, and probably the fumes of most metals.

(5.) SEPTIC POISONS; substances and morbid products which primarily produce a poisoning of the blood and thereby prove fatal. These are sausage, cheese, fish, and every kind of food-poison, which not infrequently becomes developed in perfectly innocuous food-materials in a manner wholly inexplicable, also such morbid products as glanders, cattle typhus and pyæmia.

§ 30. DETERMINATION OF THE FACT.

All that the former Prussian penal code (§ 858, Tit. 20, Part II., of the General Common Law) required to determine the fact of a doubtful poisoning, when the *post hoc* was established, that is, "when it was ascertained with certainty that the deceased had died after the administration of poison," in respect to the *propter hoc*, the causal connection between the poisoning and the death which had followed it, was nothing more than proof that the death had *probably* been caused by the poison. In the former position of the science of criminal law and of legislation, without this wise direction of the legislator, many murders by means of poison could never have been recognised and punished as such, since, had strict proof been required, a hundred subterfuges, possibilities, doubts, remarkable experiences of poisonings which had not proved fatal, even when the substance administered had been most distinctly poisonous, &c., would have been brought as counter-proof before the Judge. This statutory regulation also simplified very much the duty of the Prussian experts; since if it were once ascertained, either by the Judge, with his means of proof, or by the experts from the clinical history of the case, the results of the autopsy and of the chemical examination, "that poison had actually been administered," then the medical jurist was justified in supposing it "probable" that the fatal event in any given case had been produced by this poison, provided the clinical history of the case and the appearances on dissection corresponded in at least the more important particulars with what medical experience had already learned respecting the symptoms produced by the poison in question, and the autopsy had not revealed any other cause of death. It is quite different, however, with the present penal code, which, in every case of suspected death from poisoning, according to the clear and indisputable meaning of § 197 already quoted, requires nothing less than *certainty* (of course from the experts) that the death has been the result of the poison administered. We need not now inquire how far this important alteration has been the result of purely legal views on the part of the new legislator, or how far it has perhaps been only a logical sequence of the change of views in regard to the former general lethality categories. Since, if now every case of violent death is to be regarded individually (*Vid.* p. 238, Vol. I.), we can easily understand that the legislator regarded every single case of poisoning as a special case, and will have it ascertained whether the administration of *this particular poison has caused death in this case*, as in the other case it is required to know, *whether this particular injury has been the cause of death in this particular instance.* Though it cannot be denied that the difficulty of giving a medico-legal opinion is much increased, since the medical jurist must now state "positively," whereas he could formerly without hesitation say "probably," and certainty was never asked for, yet according to the explanation we have just given, his conscience can find a resting-place in the fact than he has to abstract the case in question entirely from every case of recovery after poisoning with the same amount of the same poison, from all idea of the possibility of the life of the person poisoned having been saved by a different mode of treatment, or of the possible concurrence of other injurious influences, and that he has only to consider whether the substance X could produce the results in question, and whether, taking into consideration all the circumstances brought to light in the investigation of the case, it can be assumed that X has actually produced these results? *The expert must therefore always remember* § 185 *of the penal code* (p. 236, Vol. I.), *and avoid all that absurd exhibition of scepticism to which this question is so apt to give rise;* and which is so common both with medical jurists and authors in regard to determining the fact of a suspected poisoning. The physician has four criteria whereon to base his opinion, when he is asked, whether "poison, or any other matter fitted to injure the health," has been administered to the deceased, and the "offence" of the administration of poison has not been otherwise determined by the Judge—viz. (1.) The morbid phenomena which the deceased has exhibited during life subsequent to the suspected poisoning; (2.) the morbid appearances found at the autopsy; (3.) the results of the chemical analysis of the contents of the body, and (4.) finally, the combination of all the external circumstances which have accompanied the illness and death of the deceased.

§ 31. (*a*) THE MORBID PHENOMENA.

It must be confessed, that this criterion affords the least certain support whereon to base an opinion. Since, in the first place, it is well known how often in cases where the law has taken cognizance of this crime, which is distinguished above all other crimes by the secrecy with which it can be carried out, there are no witnesses, particularly no medical witnesses, who have ever seen the person poisoned previous to death, to say nothing of having carefully observed the case, so that afterwards nothing is to be learned respecting the nature of the illness, or what is learned is superficial and not to be depended upon. In the second place, and this is a point not sufficiently insisted on hitherto, we must reflect, that, taken *as a whole,* all poisons—except those which produce an instantaneous or peculiar form of death, such as hydrocyanic acid, sulphuric acid, &c.—produce *tolerably similar* symptoms, such as vomiting, purging, rapid loss of strength, disturbance of the circulation, sensorial and motorial anomalies, &c. In the third place, and finally, there are many diseases which arise quite independently of the ingestion of any poison, and the totality of whose symptoms is either identical with those described, or very closely resembles them, so that it is perfectly possible to make a mistake in the diagnosis. Accordingly, even should the doubts, reasonable enough in themselves as to the fact of a supposed poisoning, be removed by the consideration of the morbid phenomena (when these are known), still, on the other hand, it must be remembered that in medicine generally, and still more in medico-legal matters, we must never conclude as to the existence of any peculiar vital condition merely from the presence of one symptom or one group of symptoms, but that to enable us to do so we must always take into consideration the entire complexity of the symptoms *as a whole*. The physician does not diagnose the existence of measles from the deceptive exanthem alone, nor from the catarrhal symptoms by themselves; nor does he suspect pregnancy merely because the abdomen is enlarged and the menses have ceased; nor strangulation, merely because there is the mark of a cord, &c., and it is also perfectly right for him not to diagnose poisoning from the pathological phenomena alone. But it is most unjustifiable to make from this the logical deduction that the discovery of the poison is the *only* means of making the diagnosis certain, because by so doing all intermediate influences and supporting proofs are completely disregarded (and these deserve as much credit as the morbid phenomena), and thus in respect to poisoning, a doctrine is propounded which is justly rejected in every other kind of medical diagnosis. And while modern science, not content with the totality of the symptoms known to the ancients, is always endeavouring to determine important morbid conditions by the invention and employment of physical, chemical, and microscopical aids, &c., in order to use this greater *totality of all* the phenomena thereby obtained as a foundation for the judgment, shall, in the doctrine of poisonings, the dogma be maintained that the result of the chemical analysis alone is the only certain proof of the fact! This traditional dogma is the consequence of the reprehensible attempt to emancipate judicial from ordinary medicine, and to reduce the former to a mere department of legal science, to a "*Jurisprudentia medica,*" and to engraft the theory of strict and invincible proof, from which even the modern science of penal justice has liberated itself, upon a science, which is a science of probabilities and not of mathematical facts.* We will return to this subject when considering the other criteria, and we now append the general morbid phenomena observed according to the classification of poisons already given.

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* We rejoice that this doctrine of ours has been recently shared and confirmed by a high authority in criminal law. "The view," says Mittermaier (Archiv

(1.) *Irritant poisons* produce, in general, heat and burning in the mouth and fauces, burning and violent pain in the stomach, and also over the whole abdomen, choking, vomiting, violent thirst, purging, coldness of the skin, cold perspiration, quickened and oppressed pulse, tenderness of the abdomen on pressure, rapid sinking, and death.

(2.) *Poisons producing hyperæmia:* dilatation of the pupil, loss of consciousness, sopor, slow irregular respiration, vomiting, constipation, collapse, clonic or tonic convulsions, paralysis, death.

(3.) *Nerve-paralyzing poisons:* sudden death, or should this not be immediate, choking, eructations, vomiting, paleness of the countenance, cold perspiration, feeble slow pulse, dilatation or contraction of the pupils, tetanic convulsions, froth over the mouth and nose, difficulty of respiration, death.

(4.) *Poisons which produee marasmus:* gradual wasting, cachectic appearance; in lead and mercurial poisonings the gums have a livid or bluish margin, the tongue coated, loss of appetite, constipation (lead colic), trembling of the limbs, paralysis, death from hectic fever.

(5.) *Septic poisons:* general depression, sickness, vomiting, local symptoms of a specific inflammation (in cattle typhus), general phenomena of a putrid fever, death.

The symptoms of the most important individual poisons will be found in § 34.

§ 32. CONTINUATION.—(*b*) APPEARANCES ON DISSECTION.

Taken by itself, the criterion of the appearances found on dissection more readily affords conclusions as to the fact of the poisoning, than the mere morbid phenomena observed during life, and there is one class of poisons, in which the cadaveric phenomena *alone* are so convincing that no doubt can be entertained, and further chemical analysis is, in truth, unnecessary, I mean the poisoning with the strong mineral acids in large doses. There is no other possible cause of death that presents the same peculiar destruction of the tissues as

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für Preuss. Strafr. v. 2, s. 150) "which required exact chemical proof of the existence of poison in the body, was a consequence of the former opinion, that crimes which left evident traces of their perpetration could only be proved by the ocular demonstration afforded by their traces; and this view was also in unison with the legal dogmas then current," &c. "But the *groundlessness* and *danger* of this earlier view is daily becoming more clearly recognised. *The value of chemical evidence is thereby very much overestimated.*" (*Vid.* remarks to § 36, further on.)

these poisons, and it is impossible to produce these appearances to such an extent as to cause confusion, even by pouring sulphuric acid into a dead stomach, as we have proved by experiment (*Vid.* § 34, further on). There are also other specific results of the dissection which permit of a certain opinion being arrived at without having recourse to the "only valuable" criterion of chemical analysis. When in the stomach of the body white granular bodies are found, which, when removed from the mucous membrane, dried and thrown on the coals, give forth a distinct odour of garlick, or when amorphous yellow particles, which have been taken from the stomach of the body, shine in the dark, and take fire on friction, or when (Case CCVI.) phosphorescent fumes stream forth from the natural openings of the body, we can, and must, at once decide upon the case being one of poisoning by arsenic or phosphorus. The like is the case when the botanically recognisable stramonium seeds, Belladonna berries, &c., are found in the stomach, the respective poisoning being at once assumed to be present without proceeding further. We must also, finally, include in this category all those bodies at whose dissection all the by-standers perceive a smell of bitter almonds, distinctly and indubitably in the brain, in the chest, and still more so in the stomach, which, in by far the greatest number of cases of poisoning, may with certainty be referred to some compound of cyanogen, since there is, we can no longer say no other, but only one other substance which, when swallowed, completely impregnates the body and its organs with the smell of this virulent poison. I mean the *nitro-benzin*, used by perfumers to scent their soap, &c., this smells strongly of bitter almonds, and thoroughly impregnated with this odour the body of an animal killed with it by us in the course of our experiments.* I quote all these instances from my own experience, to show how unwise it is to undervalue the results of dissections, or to assign all the value exclusively to the chemical analysis. In the greatest number of cases, however, the appearances on dissection will not afford perfect certainty. Since purely local inflammatory products in the fauces, œsophagus, stomach, &c., like those that follow irritant poisoning, may also have another origin. The like is the case with those hyperæmiæ which follow the class of poisons producing them, which occur in the same form more frequently from other causes. Further, most poisons present such variable products upon the dissection table, and have as yet been observed in such insufficient numbers, that it would be worse than rash to put a decisive value upon the alterations observed in the body in any individual case. Finally, that foe of all scientific examination and consideration of every cadaveric phenomenon, putrefaction, very often completely prevents the observation of any of these post-mortem appearances. For while, on the one hand, many poisons favour so rapid an invasion of putrescence, that its disturbing influence is felt even at the usual period of the autopsy, so on the other, it often happens that, from the secrecy connected with the deed, suspicions of poisoning do not arise till after the body has been buried; and after the lapse of weeks or months the body has to be exhumed for examination; its tissues being probably already so decomposed as to render any exact observations perfectly impossible, while so much of the blood has evaporated, as to make it impossible to ascertain whether any hyperæmia did formerly exist, &c. Nevertheless, viewing the matter generally, the results of the dissection taken *in connection* with the morbid phenomena observed during life, possess a *very high* value, and viewed in this manner do not deserve to be so much mistrusted as is generally the case. Finally, in properly estimating the value of this criterion in determining the existence of a merely *suspected* poisoning, we must not overlook the fact, that it alone may *negatively* decide the case and remove every doubt. In these, by no means rare cases, for instance, in which the supposition of poisoning has arisen from a combination of suspicious-looking circumstances, such as when death has suddenly followed some remarkable morbid phenomena which have originated shortly after a meal, or when a man has died in some remarkable manner, in circumstances which already appear suspicious from other causes, &c.; in such cases, these suspicions would be completely allayed by the discovery of an incarcerated hernia, of a perforating ulcer of the stomach, &c. We shall by-and-by give some cases in proof of this (*Vid.* Cases CCXXII. and CCXXIII.).

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* *Vid.* Casper's Vierteljschft. für Gerichtl. Medic., 1859, xvi. 1, s. 1.

As to the classification of the results of the dissection, we generally find—

(1.) After *irritant poisons:* in many cases inflammation, or burning of the mucous membrane with which they have come in contact, a corrugated and tanned appearance of the œsophagus, erosion, ulceration, gangrene, perforation, or thickening and swelling of the mucous membrane of the stomach, which, even when it still appears to be firm, may be easily divided by the handle of the scalpel, often there are traces of consecutive inflammation in the lungs, and in the heart, as well as in the lower parts of the intestines.

(2.) After *those poisons which produce hyperæmia*: in the body, particularly in the stomach, perceptible remains of the poison are sometimes found, which may be recognised by the smell, form, botanical characters, &c.; we also find extensive congestion of the brain, lungs, heart, spinal cord, the large venous trunks of the body, and isolated insular congested patches, which appear here and there like livid stains (stases) upon the mucous membrane of the stomach and intestines.

We shall by-and-by relate more particularly the appearances found subsequent to death from the more important individual poisons in these categories (*Vid.* § 34). As to those found subsequent to death from poisons belonging to any of the other classes, they are, as yet, undetermined and but little known, and in the occurrence of any individual case, it would be well to seek for analogies. For this purpose we shall give as full a collection as possible of illustrative cases, which have come under our own observation.

§ 33.—(c) The Chemical Analysis.

It cannot be denied that the discovery of the chemical, and also in appropriate cases, of the botanical characteristics of poisons in the body, may be *of itself* an efficient proof of the actual occurrence of the poisoning; but this is a very different statement from the dogma we have already objected to, that this proof *alone* can be relied on. The objection which is often made, that the poison may be administered after death, is of no practical value, since such an occurrence is never seen in practice, and, even if it did happen to occur, the total absence of every reactionary phenomenon would prevent any but the most careless medical jurist from being deceived. But, on the other hand, it often enough happens in medico-legal practice that poisons are chemically detected in the body, without there being in that any reasonable justification for supposing death to have been caused by poison. The poison may have been administered in the form and dose of a medicine, and to this the fact that the physician who may have been treating the case knows nothing about it, and denies his complicity, forms no objection, since it is well enough known that people often take clandestinely mercurial (laxative) pills, arsenical (fever) drops, and the like—or articles of nourishment themselves may have deposited the poison in the body. Wackenroder[*] has found very considerable quantities of copper and lead in the blood of human beings, and of domestic animals living on mixed articles of diet, whose source, independent of other contingencies, could only be sought for in articles of nourishment containing copper and lead. We ourselves have very frequently seen in the course of our numerous medico-legal examinations, that besides the suspected and discovered poison, there have been also found in the body small quantities or traces of poisonous or not poisonous metals, which could only have got into the body in this, or some other accidental manner. In this respect, consequently, the quantity of the poison found must prove decisive, and the decision in such a case is very easy. So-called homœopathic quantities of poison in the stomach, blood, &c., can be no longer reckoned poisons. But the fact now comes to be considered, that the quantity of the metal—arsenic for instance, chemically recognised, or the amount of stramonium seeds for example, botanically appreciated—by no means justifies the conclusion that *this is all* that has been swallowed, since the double, or even tenfold, the quantity may have been evacuated during life. In other cases the poison has been actually *wholly* evacuated, the person has died solely from the effects of the poisoning, and the chemical (or botanical) criterion leaves us in this case completely in the lurch. In such cases, by no means unfrequent, modern chemistry displays the great advances she has made by detecting the absorbed poison in the tissues and secretions of the body, particularly in the liver, spleen, blood, urine, even in the muscles and bones. In very many cases arsenious acid has been already thus detected. Orfila[†] has, in this way, found copper. Stas[‡] discovered nicotine in the liver and lungs of the Count Bocarmé; our experts, Schacht and Hoppe, have found hydrocyanic acid in our own cases (CCIII. and CCIV.); E. Schäfer[§] has found antimony in the urine, &c.; and we can, with almost certainty, predict that there are a great many other poisons which shall yet be detected in this manner. The chemical criterion becomes, however, also uncertain, when the poison has been destroyed by antidotes, or by the putrefactive process. Hydrocyanic acid, which, particularly in the stomachs of perfectly recent bodies, is tolerably easily detected, is, in general, no more to be found several days after death; since it is so readily decomposed when in combination with organic matters.* Phosphorus, which is so easily oxidized, is, from that very cause, no longer to be found in the body of a person who has lived several days after being poisoned with it. Further, in respect to the value to be placed upon the chemical analysis of the body, we do not require to be reminded that even the advanced chemistry of modern times must always leave many mysteries unsolved, and that there are not a few poisons—many alkaloids, for instance—which cannot be discovered by chemical tests; these, however, always rare kinds of poisoning, can scarcely be said to occur in Germany. Further, the chemical analysis may be without result, when the poison has been actually assimilated, and of this the case CCXXI. gives a remarkable example. There is still another consideration, which I cannot refrain from producing, in opposition to the common opinion which places far too high a value upon the chemical proof of the deed. The study of the writings of chemists will convince any one how much the opinions of the best authorities differ, as to the most eligible method of analysis in any given case; and whoever, like myself, lives daily amid the practical realities of medical jurisprudence, and is in the habit of constant intercourse with many renowned chemists, such as those which Berlin is so fortunate in possessing, well knows how much these views make themselves felt in actual life and in medico-legal practice, how a method of analysis highly praised by one, is rejected by another as uncertain, &c. All these reasons must make a medical jurist sceptical, for in these matters he must always remain only half an expert, and they have been the cause of my adding to the three admitted criteria, the fourth one already specified, the combination of all the external circumstances which have attended the illness and death of the deceased; but to this we shall by-and-by return (§ 35).

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[*] Archiv. f. Pharm., 1853, October, s. 11.

[†] Toxicologie, 5 Aufl. 1853.

[‡] Henke's Zeitschrift, &c., 1853, s. 139.

[§] Wiener, Zeitschrift, &c., neue Folge, 1858, 1, 10, particularly interesting from its affording proof of so rapid an absorption. In the case of a patient treated with tartar emetic, three hours and a-half after taking the first grain a distinct deposit of pure antimony was obtained from the urine, and this subsequently became better marked. E. Schäfer has found traces of arsenic one hour after using Fowler's solution, and still more distinctly several hours after the endermic employment of the powder of Frère-Cosme.

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* In a case of suicide by prussic acid, related by Schauenstein (Prager Vierteljschft. 1857, iii. s. 99), twenty-six hours after death there was no longer any trace of it to be found in the stomach, but a considerable quantity of *formic acid*, the result of the metamorphosis of the prussic acid. We have subsequently found this confirmed; and it deserves to be remembered in cases of poisoning by hydrocyanic acid.

Since the practical part of forensic chemistry, which falls to the lot of the associated chemical experts, must be left to works upon Chemistry, and the special details respecting all the poisons known to works upon Toxicology, I have only now to add a statement of the mode of action of those poisons which are of most importance, or of most usual occurrence in practice, and in doing so, wherever my own experience has been insufficient, I have made use of the most trustworthy sources.

§ 34. Continuation.—Special Poisons.

(1.) Arsenious Acid.—The absence of any odour, its tastelessness and solubility in water and in all watery fluids, its want of colour, and finally, its destructive action upon all organic life makes this poison at once dangerous and convenient. In chronic arsenical poisoning the symptoms are those of general cachexia and dysæmia, increasing to a fatal hectic fever. After an acute poisoning the symptoms are, nausea, vomiting, sometimes hæmatemesis, precordial anxiety, pain in the stomach, often but not always colic, excessive thirst and dryness of the fauces, diarrhœa, moist skin, a vesicular eruption has been sometimes observed, suffusion of the eyes, vascular excitement, great depression, frequently, at the last, convulsive attacks. But there have also been cases of fatal arsenical poisoning without the occurrence of any of those striking phenomena which we have just mentioned.

Dissection.—Partial hyperæmia, inflammation, excoriation, hæmorrhagic erosion of the mucous membrane of the fauces, œsophagus and stomach; it is also softened and easily separable. The inflammation, which may amount to gangrene, extends into the duodenum, and sometimes to the commencement of the small intestines. The blood in the heart and large venous trunks is dark and gelatinous, not firmly coagulated; the blood generally in acute arsenical poisoning is deficient in coagulating power, and never forms a firm clot. Sometimes there are ecchymotic spots upon the ventricles of the heart, and frequently hyperæmia of the brain. The phenomena of inflammation are often to be seen even when death has followed but a few hours after the poisoning. But we must expressly state, that all these cadaveric phenomena are by no means constant. The *mummification* of the body is a specific action of this poison (*Vid.* §§ 14, 21, Gen. Div.). It seems to occur in every case in which considerable doses have been administered, which have not been wholly evacuated during life. This mummification cannot, however, be termed "a certain sign of arsenical poisoning, even when this cannot be otherwise proved" (Burdach). Since the bodies of those who have not been so poisoned mummify when buried in marshy or peaty soil which contains much humic acid, also in the hot sands of the desert, in which whole caravans have been found mummified; and finally, when placed in certain conditions which are as yet wholly unknown, as is proved by the mummified bodies in the lead cellar at Bremen, one to be seen in a vault at Charlottenburg, near Berlin, and those others which are known to exist in vaults in many other places. I myself have seen very evident mummification of the upper extremities and face of a child, aged four years, who had died not from arsenical poisoning, but from the leaf of a door having fallen on its head, and whose body was exhumed for examination after it had been buried for nine months. Should, however, the other circumstances of the case favour the supposition of arsenical poisoning, this will be materially enhanced by the discovery of mummification of the body, and still more so, should the chemical analysis of the contents of the stomach, which may in such a case be still possible, reveal traces of arsenic. This has taken place in not a few cases, and in one after the lapse of ten years* (as yet the latest period after death in which arsenic has been detected). Mummification does not, however, occur immediately after death, but very gradually, whilst at first (probably before the arsenious acid has been metamorphosed into arseniuretted hydrogen, and has impregnated the body?) the process of putrefaction proceeds as usual, nay, older observers assert that it proceeds more rapidly than usual. Hence it follows, that *the absence* of mummification of the body, particularly recently after death, can neither prove nor give the slightest reason to suppose that there has been in that case *no* arsenical poisoning. We find *the growth of mould* upon the body described as characteristic of arsenical poisoning, because compilers have found this appearance described in individual cases; but this appearance is found upon every body, *without exception,* which has been exhumed after being buried for some time, and is, therefore, by no means characteristic of this or any other form of poisoning. The occurrence of arsenic normally in the bones, as supposed by Couërbe, Raspail, and Devergie, has not been confirmed.

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* Archiv f. Pharm. 1853, s. 150.

(2.) Sulphuric Acid.—This poison, from its well-known violent and instantaneous corrosive action, can only be used to murder young children, of which a few cases come before us almost every year, or adults in a state of unconsciousness. On the other hand, cases of accidental, or suicidal poisoning from this cause occur (in Prussia) more frequently than from any other poison whatever. The external skin, when acted on by this acid, becomes yellowish-brown, and of a leathery hardness, the mucous membrane, with which it comes in contact, as that of the tongue, cheeks, &c., becomes immediately white (yellow when the acid is nitric from the formation of xanthoproteic acid), and, after two cases which have recently come before me, shortly after one another, I must warn against the white coating of the tongue from muguet (white thrush) in young children being confounded with that produced by the corrosive action of the acid. Immediately on the administration of the poison there is produced a most violent burning pain in the mouth, fauces (often accompanied by a feeling of constriction) and stomach, burning thirst, vomiting, hæmatemesis; and should the dose of the poison swallowed have been anything considerable, rapid death. At the autopsy, any external stains visible about the lips, or, as frequently happens, about the angles of the mouth, running in streaks down towards the neck, are yellowish or dirty-brown, leathery to cut, and the true skin beneath them often completely destroyed; the mucous membrane of the tongue and fauces white, the œsophagus is only, in the rarest cases, carbonized like the stomach, generally only hard to cut, as if tanned, and of a grey colour; the vascular injection of its mucous membrane may still be recognised. On the other hand, after anything like an acute case of poisoning, the stomach is found to be quite peculiarly and diagnostically unmistakably black, as if carbonized; its tissues completely gelatinous, and it is almost impossible to remove it from the body, since the very gentlest touch of the forceps tears it to shreds.* Sulphuric acid, when permitted to act upon capillary vessels, takes a long time to destroy them, but in a few hours their tissue is so softened, and probably partially dissolved, that they fall to pieces at the slightest touch. Their coats therefore become so soft that in the living man they cannot efficiently withstand the pressure of the blood, but rupture, and give rise to effusion of blood. These extravasations of blood coming thus into direct contact with the acid, explain the black colour of the coats of the stomach and of its contents. And this also explains why, as I have found by experiment on dead bodies, sulphuric acid poured into a dead stomach does not produce an appearance at all resembling that described, but only corrodes, and finally destroys and dissolves the stomach, its colour remaining all the while only a light greyish-black, because in this case we have no extravasation of blood-corpuscles. When the sulphuric acid acts less intensely, or has been immediately neutralized by absorbents, life may be either saved, or at least prolonged for weeks, and there is then found in the stomach only the traces of an acute or chronic inflammation, particularly thickening or ulceration of the mucous membrane,—an appearance which of course precludes any certainty of conclusion as to the pre-existence of poisoning by sulphuric acid. I have never found the blood in the body, after acute poisoning by sulphuric acid, fluid, but always syrupy at least, and sometimes more ropy. It has a cherry-red colour, and *acid reaction;* indeed, I shall by-and-by relate a case (CXCVII.), in which I found the pericardial fluid and the *liquor amnii* acid, the person poisoned having been pregnant. In many cases the chemical investigation of articles of clothing belonging to the body, which may have on them stains or holes, may supplement the diagnosis (§ 46, Gen. Div., p. 206). A remarkable, and not hitherto related, effect of poisoning by sulphuric acid (and possibly of all the other mineral acids; but of these others I have had no experience) is its antiseptic virtue. The bodies of those thus poisoned remain, *cæt. par.*, very long fresh, and usually give forth no ill smell upon dissection. The reason of this cannot well be any other than that the acid neutralizes the ammonia arising from the putrefactive process until itself is neutralized. Independent of the correctness of our explanation, the truth of our observation will be found confirmed in the case of every such body (§ 14, Gen. Div.).

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* *Vid.* the representation of such a stomach, Plate ix. Fig. 26.

(3.) PHOSPHORUS.—The necrosis of the jaw-bones, which occurs in the lucifer-match manufactories, and which it is doubtful whether it be due to phosphorus or no, is a matter of medical police, and not of medical jurisprudence. On the other hand, to our department belong those cases of the poisoning of children by lucifer-matches which have several times occurred, and specially those cases of actual and fatal poisoning, whether as murder or suicide, which in recent times have become more and more frequent since the introduction of phosphorus-paste as a means of destroying rats, has made the public acquainted with a poison so fearful as this, of which one or two grains taken at once is sufficient to cause death. Its immediate effects are a violent burning pain in the stomach and belly, frequent eructations of gas smelling of garlick, vomiting of matters having the same smell, which, as well as the watery stools, shine in the dark, great anxiety and restlessness, pulse small and scarcely to be felt, cold perspiration, subsequently a peculiar prostration; sometimes in men there is priapism, and rapid death, which is sometimes quite peaceful, at others attended by convulsive phenomena.

Dissection.—Peaceful expression; slight excoriations in the mouth and fauces; a distinct smell of phosphorus coming from the mouth of the body, and a streaming of phosphoric vapour from the vagina and the relaxed open anus, which by daylight appears like thin smoke, but shines in the dusk of the evening, as I myself have seen (Case CCVI.); sometimes, but not constantly, there is a petechia-like exanthem, which has come out towards the close of life; the peritoneum is reddened and inflamed; sometimes the stomach is distended with gas which stinks of garlick, and often in the folds of its mucous membrane particles of phosphorus may be found which, when lightly dried and rubbed, take fire.* The whole of the contents of the stomach shine in the dark, especially when gently warmed; the mucous membrane of the stomach is partly ash-coloured, partly of a dark purplish red, and exhibits gangrenous ulcers which penetrate deeply into the muscular coat; the *duodenum* and even the lower parts of the bowels exhibit the same anomalies; the pancreas and kidneys are deeply reddened; the abdominal veins are strongly congested with a dark and somewhat treacly blood, with which also the lungs are completely gorged; the heart is flaccid, its coronary veins and right side hyperæmic, the mucous membrane of the œsophagus is deeply reddened and partially eroded. There are no peculiar appearances in the cranial cavity. But as in the case of death from other organic poisons, the appearances on dissection may be more or less negative, and of this I shall relate two instructive cases (CCV. and CCVI.). Death in this case, then, as perhaps in the case of many more poisons than it has as yet been recognised, occurs dynamically by destroying the life of the blood. In the cases we have related, *the blood-corpuscles were deprived of their colouring-matter and were colourless and transparent, the colouring-matter being dissolved in the uncoagulated plasma*, the whole presenting the appearance of a syrupy, cherry-red, translucent fluid. By such alterations the blood would lose its power of nourishing the body and preserving life.*

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* For the most recent and delicate method of detecting phosphorus, *vid.* a paper by Mitscherlich, in Casper's Vierteljahrschft., Band. viii. s. 6, &c. And for a large number of cases of intentional or accidental poisoning with phosphorus, chiefly in France, collected by Henry and Chevallier, *vid.* Etudes Chimiques et Medicales sur le Phosphore, in the Annales d'Hygiène, publ. 1857, April, s. 414, &c.

(4.) Colchicum and Colchicine.—The rare occasion afforded us of making a medico-legal examination of the bodies of *four* men poisoned at the same time by the same preparation of colchicum (*Tinct. Sem. Colch. Pharm. Borr.*), and the careful investigation to which these cases gave rise, and in which the most distinguished chemists took part, has not only originated the discovery of a method of detecting colchicine,† but has also taught us that colchicine is a most virulent poison, scarcely to be compared in deadliness with phosphorus itself among those poisons which occur with us, since our four poisoned men (Cases CCXI.—CCXIV.), aged from 15 to 40 years, had each taken at once only at the most *from two-fifths to half-a-grain* of colchicine, and yet this dose was sufficient to produce rapid death. The effects of the colchicum in those cases described by us, as well as in the few others known, were a feeling of oppression and anxiety, a burning sensation in the mouth and fauces, violent pains in the belly, which are not always increased by pressure; violent and continuous vomiting of greenish or orange-yellow bilious matter, an equally violent diarrhœa, burning thirst, collapse, pale countenance, normal pupils, moist and clammy skin, spasmodic pulse, beating 80—90 times per minute; retention of urine, and rapid death from exhaustion.

Dissection.—We found in all our four cases—no unusually rapid occurrence of putrefaction; acid reaction of the gastric fluids and of the urine; the dark cherry-red, treacly condition of the blood, precisely as in poisoning by sulphuric acid;‡ most remarkable congestion of the vena cava; considerable hyperæmia of the kidneys; urinary bladder more or less full; hyperæmic congestion of the right side of the heart and of the cerebrum, and moderate congestion of the lungs. The stomachs, on the other hand, presented different appearances; in one case there was a vascular network, visible externally; internally a uniform scarlet appearance of the mucous membrane, consequently true inflammation; in another, there was great distention of the blood-vessels of the smaller curvature, the mucous membrane, on the contrary, pale and only ecchymosed posteriorly; in the third and fourth, the stomachs were quite normal. In the other cases on record, the stomach and intestines are also sometimes described as having no trace of inflammation, and in two cases, particularly, nothing at all anormal was found on dissection.

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* *Vid.* also a like remarkable destruction of the blood-corpuscles by poisoning with a solution of caustic soda, in Case CCXV., and by suffocation in carbonic acid and sulphuretted hydrogen gases, in Case CCLXI.

† *Vid.* Casper's Vierteljschft. 1855, s. 1, &c.

‡ Prof. K. Schroff has found a similar condition of the blood in six rabbits experimentally poisoned with about seven grs. (imp.) of colchicine, viz., the treacly condition of the blood and its colour, called "pitchblack" by him. *Vid.* Œsterr. Zeitschrift für pract. Heilk. 1856, No. 22-24.

(5.) POISONOUS FUNGI.—To this class belong particularly *agaricus phalloides, muscarius, integer* and *Boletus luridus*, as unquestionably poisonous, whilst the deleterious action of other suspicious fungi is still doubtful. They produce a disagreeable harsh taste in the throat, a feeling of disgust and nausea, vomiting, giddiness, exhaustion, colic, diarrhœa with tenesmus, violent thirst, difficult breathing, convulsions, and death.

The reports of the *dissection* of such cases are not extant in sufficient numbers to justify any diagnostic inferences from them. Gastro-intestinal inflammation has been found, along with a dark-coloured and very fluid blood, with which the right side of the heart was distended and the lungs congested.

(6.) OXALIC ACID (*and salt of sorrel—binoxalate of potash*).—I cannot from my own experience confirm the statement that this extremely dangerous poison, which may be very readily taken by mistake, is particularly fancied by suicides, specially by such as work in cotton printing establishments where it is employed as a bleaching agent, since not one single case of poisoning by oxalic acid has ever come before me, though Berlin possesses the largest cotton factories in Germany. Throughout the whole monarchy also cases of poisoning by oxalic acid are extremely rare, as my official position enables me to state positively, while in England such cases are said to be extremely frequent. The reports as to the action of this poison are tolerably unanimous; it produces burning in the mouth, nausea, constriction of the throat, frequent acid eructations, violent colics, diarrhœa, very rapid prostration of strength, convulsive attacks, and extremely rapid fatal termination.

Dissection.—The mucous membrane of the fauces and of the œsophagus is whitish, that of the stomach and duodenum of a pale or bright-red colour, patches of it gangrenous, of an ashy-grey, and elevated in rugæ, when death has not been rapid, and usually white, soft and brittle; the blood is dark and treacly; the brain, lungs, right side of the heart and large thoracic and abdominal veins are all much congested. When sufficiently diluted to be absorbed, this poison has produced tetanus and paralysis of the heart in animals.

(7.) CORROSIVE SUBLIMATE.—This also scarcely occurs in practice. According to recorded observations, it produces a disagreeable metallic taste, violent burning in the fauces, inflammation and erosions of the gums and tonsils, vomiting of blood, burning thirst, bloody stools; no important alteration in the pulse, suppression of urine, no particular distention nor pain in the stomach, and finally death, which, even after a dose of three drachms (℈viijss. Eng. ap. w.), did not ensue till the sixth day.

Dissection.—Violet, or in other cases, whitish coloration of the mucous membrane of the mouth and fauces; the mucous membrane of the stomach is thickened, corroded and gangrenous; the mucous membrane of the intestines is for a considerable extent inflamed and covered with bloody mucus; the large intestines are contracted; the kidneys somewhat reddened; the urinary bladder small and contracted; there is also vascular injection of the trachea and bronchi.

(8.) HYDROCYANIC ACID (and *cyanide of potassium, cherry laurel-water*, and *the essential oil of bitter almonds containing prussic acid*).—When prussic acid is employed as a poison, that is taken in any considerable quantity, we have no vital morbid phenomena to observe, for death is either instantaneous, or very speedily follows a primary attack of complete general paralysis.

Dissection.—The perception of the odour of bitter almonds in the interior of the body, which has been disputed, depends entirely on the time that has elapsed between the death and the autopsy. Should the prussic acid in the body be already decomposed, which it very readily becomes when in contact with organic matter, then there will be no odour perceptible, but this will never be absent from any of the cavities, but particularly from the stomach, whenever the autopsy has been proceeded with as soon after death as possible, as I and my assistants have often experienced. The blood in the body is always fluid and very dark; there is considerable hyperæmia in the cranium; the lungs and heart are not always congested; on the other hand, congestion of the liver, kidneys and inferior cava has been always present. The stomach, in a perfectly recent body, except the odour of bitter almonds, betrays no other constant symptom; "dark, reddish-brown coloration" of the entire organ, externally as well as internally, with "apparent congestion of isolated venous cords," which have been seen after such cases of poisoning, are characteristic of putrefaction, and not the result of the poison.

(9.) Opium *and its constituents and compounds* (*also poppy heads*).—The effect of small doses has been learned at the sick-bed. In poisonous doses, opium produces first nausea, inclination to vomit and actual vomiting, which is not, however, apt to become violent; sometimes the face is hot and swollen, particularly in the case of little children poisoned with decoction of poppy heads (given to soothe them), sometimes it is the exact opposite, pale and collapsed, the skin is bathed in cold perspiration, great drowsiness up to actual stupor, pulse firm and rapid, fits of spasms extending even to general convulsions; breathing slow and stertorous, the mouth covered with froth, complete prostration of the sensibility, so that the most powerful stimulants are no longer responded to, constipation and retention of urine (after acetate of morphia there is said to be constantly (?) an itching in the skin and a petechia-like eruption); death follows these phenomena, but is frequently kept off by active treatment, even when the symptoms are most threatening. There is, moreover, no other poison besides opium, after which the morbid phenomena have been observed so variously modified, and still less than after most others can its symptoms be reduced to an appropriate semeiotic scheme, according as its course has been acute or chronic. And the same may be said of the appearances on *dissection*. In recent cases, and after large doses of opium, *e.g.*, the officinal tinctures, the stomach exhales a distinct odour of opium. This, along with the evidence of the presence of opium obtained by chemical analysis, will be sufficient proof, while other morbid phenomena, such as ecchymotic patches in the mucous membrane of the stomach, hyperæmia of the stomach and large abdominal veins, of the lungs and heart, and particularly excessive hyperæmia of the cranial cavity, as well as remarkable fluidity and dark colour of the blood, all occur much too frequently after other poisons, or indeed after entirely different kinds of death, to be of any important diagnostic value.* The *hair* of those poisoned, particularly by narcotic poisons, is said to be easily pulled out, and this has been generally admitted as adjuvant proof of the fact of the poisoning in doubtful cases. Now it is quite true, that particularly after narcotic more than after any other poisonings, the hair of the body is so easily pulled out, that the slightest touch brings away a whole handful. It is quite erroneous, however, to suppose this to be diagnostic of poisoning, as it is *nothing else* than the result of putrefaction, which after poisoning of every kind, but particularly after narcotic poisoning, ensues, *cæt. par.*, with great rapidity. Every body somewhat advanced in putrefaction affords a proof of the correctness of this statement. There is one other important point in relation to poisoning with opium to which I must direct attention; the chemical constituents of opium are, generally, those of our food, and from this the fact that often even large doses of opiates are digested, and are then no longer to be chemically detected in the body, receives its explanation, and this circumstance may increase the difficulty of determining the fact of a poisoning with opium. (*Vid.* Case CCXXI.)

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* In the case of a woman, aged 28, poisoned by an ounce of laudanum,

(10.) ALCOHOL.—The effects of alcohol on the living body are far too well known to require any description here. We have had occasion to examine very many bodies of those who have died suddenly when very drunk from an actual alcoholic blood-poisoning. The *dissection* revealed as something specific the very slow advance of putrefaction, as shown not only by the entire absence of every trace of it externally, even at a period when it might otherwise have been expected, but also in the internal organs themselves which exhaled no cadaveric odour at all, but rather that of recent flesh, or in some cases a faint odour of brandy, which according to Duchek's investigation (Prager Vierteljahrschft., 1853, III.) depends upon the rapid oxidation of the alcohol remaining in the blood in such cases, and its conversion thereby into aldehyde.* The appearances constantly found were, hyperæmia of the brain, sometimes cerebral hæmorrhage; hyperæmia of the large abdominal veins, or hyperæmia of the lungs and heart, and always visible fluidity and dark colour of the blood.

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the dark "tarry" condition of the blood in the large veins, the four cardiac cavities in the aorta, was something quite remarkable. Maschka, in the Prager Vierteljschft. 1859, i. s. 138.

* Duchek's explanation has been, however, proved to be erroneous, by the investigations and experiments of R. Masing, *Diss. Inaug. de Muta- Spiritus Vini in corpus ingesti.* Dorpat, 1854. *Vide* also Beiträge aerzte) zur Heilkunde III., 3. Riga, 1855, s. 331.

Lymphatic exudation between the cerebral meninges, so that the pia mater upon the cerebal hemispheres is seen here and there whitish and as if varnished, is not a result of death from drinking, but is the gradual result of the chronic irritation of the brain by habitual drunkenness, and is, therefore, a very common appearance in the bodies of all drunkards from whatever cause they have died. The action of a few other poisons will be found exemplified in the illustrative cases related further on. And for suffocation from irrespirable gases and death from chloroform (*Vid.* §§ 39 and 64).

§ 35. CONTINUATION.—(*d*) THE INDIVIDUAL PECULIARITIES OF THE CASE.

We have already pointed out (§ 30), that the combination of all the external circumstances coincident with the illness and death in any given case, may be taken as a fourth criterion in determining the fact of the poisoning where doubtful, and in reality practical experience teaches us that the consideration of these circumstances is by no means to be neglected in forming even a *medico*-legal opinion. Even the physician by the bedside cannot escape the necessity of taking these circumstances into consideration in a case where the diagnosis is doubtful, and we cannot see, why a medical jurist should act otherwise, and exclude the aid to be derived from the universal principles of human reasoning, particularly in regard to a question in which pure and exact science is much more apt to leave him in the lurch, even than in the case of doubtful suicide, in which, however, the consideration of these external circumstances, has always, and rightly, been recommended. A few examples from my own experience may suffice to exhibit what is here meant:—A man was said to have been poisoned by the seducer of his wife, and with her cognizance, by means of electuary of phosphorus spread upon bread and butter. He only took the half of this piece of bread because he did not like it, but severe symptoms of poisoning were rapidly developed, and after a short illness he died. The body was not examined till some time afterwards when suspicion arose, and then it had to be exhumed for this purpose, when, of course, the advance of putrefacfaction had rendered the appearances on dissection very uncertain, nevertheless, distinct traces of inflammation of the intestines were still to be found. The chemical analysis, on the other hand, was quite resultless; we may remark, however, that it was by no means so accurate as it ought to have been. (It was made in a small country town.) The precognition now revealed, amongst many other highly suspicious circumstances which had no relation to the medical evidence, by the unanimous testimony of several witnesses, simple country folk, servants and the like, the remarkable circumstance that the fingers of that hand of the deceased with which he held the bread and butter while eating, shone in the darkness of the stable, whither he had immediately afterwards gone, and that the remains of the bread and butter next day smelt of lucifer matches, which the witnesses did not know how to explain! Has the man been poisoned with phosphorus? Does the consideration of these circumstances, involving the peculiar properties of phosphorus, belong to the province of *the physician?* In another case, in which there was the same motive for the crime, a man, moving in the higher circles of society, who had a *liaison* with a young and pretty woman, was said to have poisoned her husband, his own friend, with arsenic; it was ascertained that so often as the accused, who did not live on the spot, came to visit his friend, the latter, a robust and healthy man, was always taken violently ill after a meal, with symptoms indicative of some irritant poison, which, however, under the existing circumstances, was never for one instant thought of. Finally, the husband died, and his friend married the widow. After the lapse of a long time the body was exhumed. It displayed a great amount of mummification, but no arsenious acid could be detected chemically. On the other hand, in searching the house of the accused, there was found in a jar lying in a trunk a quantity of white arsenic, from which a considerable quantity was missing, according to the poison receipt which he exhibited. Has arsenic been administered to the deceased? I may call to mind the case of doubtful arsenical poisoning (related in § 28, p. 71, Vol. I.) which belonged to an earlier period of my official practice, in which so many external circumstances seemed to point to the reality of the poisoning, which the accused had, as it were, confessed by committing suicide in prison shortly after the opening of the inquiry, but which, according to the usual medico-legal scepticism, could not be proved. Similar circumstances are in the course of the investigation ascertained to have accompanied the illness and death in almost every case of secret poisoning; and, to lay them wholly aside in estimating a case medico-legally, is to reject a most valuable adjuvant to the judgment. An adjuvant only! For I have no desire to lay down the doctrine that the medical jurist, in the absence of all and every other criterion, should, or ought to draw conclusions from accessory circumstances alone, this he may safely leave to the jury; but my own long experience has convinced me that the theoretical subtilties, the *ifs* and *buts* of most of the text-books of medical jurisprudence, in relation to many queries, particularly in relation to cases of doubtful poisoning, do not assist in attaining the desired end, and lead to a declaration of incompetence on the part of the medical jurist, which is destructive to his science, and actually without foundation; so long as we must confess that circumstances, such as the shining of the fingers in the dark, a periodical illness following meals in any given case, always accompanied by the same suspicious symptoms, and occuring at different times, any exclamation of the sick person, such as "That tastes strongly of garlic," &c., *are data susceptible of a medical explanation*. And, after all, what foundation is there for this subtle scepticism? Does it rest upon the fact that the phenomena attendant upon many kinds of poisoning resemble those, for instance, of Asiatic cholera, and that this must consequently lessen the value of the proof to be derived from these phenomena? But the cholera was not then raging in the place, and no one has been ill of such a disease either before the illness, or after the death of the deceased! It *might*, however, have been a sporadic case!! Will not, I ask, the post-mortem appearances make this clear? In other cases, the incontestable fact is called to mind, that after many poisons the appearances found on dissection are almost negative, or resemble those found after other kinds of death, as, for instance, in the case of narcotic poisoning and suffocation. It is not, therefore, proved that the deceased has died of narcotic poison, he may have been suffocated! But with what, or in what has he been suffocated? Not the faintest semblance of a fact speaks for this supposition, save the resemblance of the post-mortem appearances found in the one case with those found in the other. Even in cases in which it was positively known that poisonous substances had been swallowed, as where several children have, out of frolic, eaten bread and butter spread with rat-poison, and have shortly after sickened with the same symptoms, and speedily died; and in other equally evident cases, which I could and shall relate from my own experience, the same customary scepticism has put in its claim to be heard, and although the deaths have happened under such peculiar and striking circumstances, and could not be otherwise explained in accordance with any of the known laws of medical experience, yet it was only, and even that with reluctance, assumed that "probably" poison had been the cause of death, "because the only certain proof of death from poison, the discovery of the poison by chemical analysis in the contents of the body," could not be made, owing to the circumstances of the case! We strive against this dangerous dogma, as well as against many others derived from *à priori* views, and deep-rooted in the traditions of our science, in the full belief of which we ourselves commenced our practice, because our extensive practical experience has firmly convinced us of their complete untenability, and perfectly satisfied us that, from the deficiences inalienable from the nature of the matter, from the scientific defects and inaccuracies inherent in the chemical investigation, it is perfectly impracticable, and that it is an unwarranted disparagement of general medical experience in regard to the origin and course of fatal diseases, as well as of a sound understanding, to seek for the conclusive and only proof exclusively in the test-tube of the chemist. This is our confirmed opinion, and it has recently obtained a tranquillizing confirmation from the forensic authority already mentioned; for Mittermaier says, (*op. cit.*, p. 152), "Because chemical analysis is unable to afford any proof that poison has been administered, we may not conclude that none has been given; we must fall back upon the proof afforded by *other sources of information;*" and the renowned criminal lawyer adds thereto, the following instructive remark:—"This doctrine may be regarded as the recognised one in all the law courts of Germany, France, England, North America, Italy, and the Netherlands."

§ 36. CONTINUATION.—CONCLUSIONS.

In taking a retrospective glance at what we have just said respecting the determination of the fact in cases of doubtful poisoning, we arrive at the following conclusions:—

Should chemical analysis determine the existence of any poison in the body, this is a certain proof of the previous occurrence of poisoning, even when the clinical history and morbid appearances found after death do not contribute any further evidence.*

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* I need scarcely repeat here, that I do not now speak of mere "traces" of poison, which may have been chemically detected, but which cannot be recognised as poisonous. In regard to this, I may refer to p. 53, Vol. II., where this matter has been already considered.

But the reverse of this is *not* true, and for this we have already given our reasons (§ 33). *The proof from chemical analysis dare not be further pushed.*

In the absence of chemical proof, should the clinical history, the post-mortem morbid appearances, and the individual concomitant circumstances of the case, point to the occurrence of poisoning, whilst the phenomena observed during life and after death do not permit the assumption of any other cause of death, then the medical jurist is justified in assuming with certainty the fact of poisoning having occurred. In the absence of chemical proof, and the total want or absolute insufficiency of any clinical history, should the appearances on dissection, and the concomitant circumstances of the case, agree in excluding the idea of any other cause of death, the medical jurist is justified in assuming the fact of poisoning either with the greatest, or only with a high degree of probability. The individual circumstances of each separate case must here point out the limitations. In such cases the physician may do much by the mere manner of wording his opinion, *e.g.*, "That according to all the circumstances of the case, which we have just related, the supposition that the deceased had died from poison seems the most probable, and no other supposition meets with such support from the circumstances of the case," &c.

Finally, we have already pointed out (p. 49, Vol. II.) that there are cases which require no chemical analysis nor clinical history, but in which the appearances found on dissection are alone sufficient to determine with certainty the fact of a poisoning having occurred. In conclusion, as regards the question whether, the fact of the poisoning having been determined, this has actually been the cause of death? (Penal Code, § 197), the answer to this can never be doubtful. For when we reflect that the action of any poison is as yet scarcely determined even generally, and is utterly unknown in its individual relations; that, therefore, the fact is well enough known, though it cannot be explained, that A. is not killed by ten or twenty grains of the poison X., of which from two to four grains suffice to poison B. and C.; that the very same poison, administered in different forms, may produce quite a different series of morbid phenomena; that the treatment of the symptoms of poisoning is still very unsettled; and, finally, that § 185 of the Penal Code expressly excludes all general categories of lethality, and requires each case to be individually regarded; so we of necessity arrive at the following conclusion, when the fact of the administration of poison has been proved, and the person has died under phenomena attributable to poisoning, and the post-mortem appearances reveal no other cause of death,—then the death is to be regarded as *the actual result of the poison*. Under certain peculiar circumstances, of course, doubts may indeed be justifiable, but then these very peculiar circumstances will subsequently easily permit the rectification of these doubts in the opinion given.

§ 37. Homicide or Suicide?

In the case of poisoning there is seldom any doubt whether death has arisen from suicide or the crime of a third party. Since only such poisons as are generally known to be certain poisons, as sulphuric acid, arsenic, prussic acid, and phosphorus are used by suicides. On the other hand, poisons which have a very disagreeable taste, or which produce instant and violent pain in the mouth, as, for example, sulphuric acid, corrosive sublimate, nitrate of silver, the extremely bitter (poisonous) alkaloids, &c., exclude all idea of murder, for no man in his senses would willingly swallow such poisons. Little children are, however, not unfrequently poisoned with sulphuric acid by their unnatural mothers. Poisons which are in daily use, either in the household as sulphuric acid, or arsenic, phosphorus, and nux vomica (strychnine); as rat-poisons, or are employed in manufactories or trades, as all the many poisonous dyestuffs, &c., occasion many cases of accidental poisoning. But it is not difficult to decide this question according to the circumstances of the individual case.

§ 38. Illustrative Cases.

Cases CLXXXIII. and CLXXXIV.—Two Cases of Poisoning with Arsenic.

According to a police notice, the boy Feld, aged 6 years, and the boy Massow, aged 5 years, were stated to have died on the 13th of June, 18—, from the effects of rat-poison. It was ascertained that the ratcatcher had placed arsenic upon biscuit, and that the children had eaten some of it. Feld died after six, and Massow after twenty-four hours' continuous vomiting (nothing further could be learned as to their illness!). The following were the most important appearances found at the medico-legal examination of the bodies, which took place upon the 15th of June:—(1.) in Feld's case, the first traces of putrefaction were visible in the abdominal coverings, the stomach was externally pale, and contained about five ounces (imp.) of a yellowish-green alimentary fluid; on the posterior part of its mucous membrane there were numerous ecchymotic patches, and several excoriations, and on these spots granules were distinctly to be felt; the intestinal canal was empty and pale and displayed no vascular injection; the blood in the large abdominal veins was dark and treacly, the peritoneum and all the other abdominal organs were normal. The lungs and heart were not remarkably congested, nor in any other way anormal; the large blood-vessels contained a little dark, treacly blood; the œsophageal mucous membrane was pale. There was slight engorgement of the meningeal vessels and the sinuses; the brain displayed nothing unusual. (2.) The body of Massow was still perfectly fresh, the intestines were quite empty, and displayed the usual cadaveric colour, without any remarkable vascular injection; the stomach appeared somewhat more injected externally; it contained about three ounces (imp.) of a bloody fluid; the whole of its mucous membrane was of a purplish-red, and almost entirely covered with purplish-red ecchymoses; there were no ulcerations. The vena cava contained a tolerable quantity of dark treacly blood; the abdominal organs displayed nothing remarkable. The œsophagus was empty, its mucous membrane pale, and all the thoracic organs normal in every respect. The cerebral meninges were much congested, indeed on the posterior half of the left hemisphere there was an extravasation of blood three inches long and one inch and a-half broad; the choroid plexuses were also tolerably congested, but neither the substance of the brain nor the sinuses were so. Along with our sworn chemical expert we examined the stomach and its contents, as well as the blood, of both bodies in the usual manner, and we found that the stomachs of both children contained white arsenic both in substance and in solution, but no trace of any other metallic poison, while the blood of neither body contained any trace of arsenic, which, from the short duration of the illness, had not had time to be absorbed into the blood. We could, therefore, have no difficulty in declaring that the death of both children had been caused by poisoning with arsenic.

CASE CLXXXV.—POISONING WITH ARSENIC.

On the 4th of July, 18—, E., a journeyman tinsmith, aged 20, was received into the Charité Hospital, labouring under continuous vomiting and purging. He could no longer speak so as to make himself understood, but his thoughtfulness was evinced by a piece of paper in his waistcoat pocket, on which was written, "I have taken arsenic." Hydrated Sesquioxide of Iron was administered to him in large quantities, but he died, nevertheless, in twenty-four hours. On the 7th of July his body was examined, and we found, a livid-red countenance, and commencing putrefaction of the abdominal coverings; the posterior wall of the stomach displayed externally a round, dark, livid stain, about two inches in diameter, and one, the size of a silver threepenny-piece, on the anterior wall, two inches from its cardiac extremity; the whole of the anterior wall was of a more or less bright-red colour; in the stomach there were about thirteen ounces (imp.) of a chocolate-coloured homogeneous fluid (oxide of iron); at those parts of the internal mucous membrane corresponding to the patches already described, there were a great many striated and insular black stains (hæmorrhagic erosions), and many white granules firmly adherent to the mucous membrane could be recognised by means of a glass. One of these, dried and burnt, gave forth a garlicky odour. The peritoneum was not inflamed. The steel-grey (drunkard's) liver somewhat congested with dark fluid blood, the gall-bladder was full, the spleen soft, the urinary bladder was empty, the intestines were empty, and displayed nothing unusual, the vena cava contained but little blood. The lungs were normal; the right side of the heart distended with dark grumous blood, the left side contained only about a tablespoonful of more fluid blood; the large thoracic vessels also contained much grumous blood; the larynx and trachea were pale, and contained a little dark-coloured mucus, the œsophagus was pale and empty, but beset with a number of small white granules. In the head there was only the usual amount of blood, and there nothing else of importance was found. The stomach and its contents, the œsophagus, pieces of the liver, and blood from the body were chemically analyzed. Both in the stomach and œsophagus, as well as in the deposit from the contents of the stomach, arsenious acid and oxide of iron were found; these were also easily discovered in the fluid part of the contents of the stomach, but neither the blood nor the liver contained any arsenic.*

Case CLXXXVI.—Arsenical Poisoning from a Cake of Water-colour.

A boy, aged two years and a-half, had, on the 30th of June, swallowed a piece of a cake of green colour out of a box of water-colours, and died in five hours in spite of medical aid. After swallowing the poison his mother immediately gave him some vinegar, which he instantly vomited. Milk, which was now given him, he vomited continuously, quite green. I have not learned what his medical attendant gave him. The body was examined on the 4th of July; the cadaveric rigor was still present, but along with it the abdomen was also green. The anterior wall of the stomach was of the usual pale cadaveric colour; posteriorly, on the small curvature, there was a dirty bluish-red gelatinous patch, two inches long, in which no vascular injection could be seen, even with the aid of a magnifying glass (post-mortem product?). The stomach contained half-a-cupful of a brownish-red fluid, "from the cardiac orifice over one-third of its surface a layer of brownish mucus covered the mucous membrane, which over its whole extent was of a feeble violet colour, and displayed no isolated, reddened, nor dark-coloured patches, nor any erosions or the like." The liver and spleen were anæmic. On the inferior surface of the jejunum there were a few small isolated round black patches visible on the mucous membrane, and which could not be washed off; the rest of the intestinal mucous membrane was pale and normal; all the intestines were empty; the vena cava was moderately filled with normal-looking blood. The lungs were anæmic, not œdematous; the left side of the heart contained half-a-teaspoonful, and the right half-a-tablespoonful of semi-coagulated blood, while the large blood-vessels contained a quantity of similar blood. Larynx and trachea were pale and empty; the œsophagus was also empty, and its mucous membrane quite normal. The veins of the pia mater and the sinuses were hyperæmic. The cortical substance of the brain had a faint bluish appearance; there was nothing else remarkable. The chemical analysis of the cake of colour, part of which the child had swallowed, revealed, as was to be expected, that it was the arsenite of copper (Scheele's green). The stomach and œsophagus, when tested by Marsh's process, gave a very distinct though feeble arsenical stain. Copper could not be detected in the stomach. The *duodenum*, and a suspicious-looking black-coloured part of the *jejunum*, gave no trace either of arsenic or copper. The blood also contained no arsenic, but pieces of the liver and spleen gave distinct though feeble arsenical stains (after an illness of only five hours!), and the presence of arsenious acid in the body was thereby distinctly proved.

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* *Vid.* also Cases CCVIII. to CCX.

CASE CLXXXVII.—PRETENDED POISONING WITH ARSENIC.—CAN ARSENIC PASS INTO THE HAIR?

A very rich, old and childless, woman had died after a tedious illness from a recto-vesical fistula, and its sequelæ, hectic fever and dropsy. The very considerable amount of property which she left behind her gave rise to family quarrels, and a female collateral relation in particular asserted that the deceased had been secretly and slowly poisoned with arsenic, and went even so far in her denunciations as to term certain respected members of the family "murderers." Always repulsed with the answer that inquiry had been made, she always returned to the public prosecutor with some fresh story, till at length she gave notice, that she had given some of the hair which she had cut from the deceased when in her coffin to the Apothecary H., in X., for analysis, and that he had found arsenic in it! On account of this discovery, she required the exhumation of the body and its medico-legal examination. The public prosecutor requested my advice regarding this extraordinary assertion, and the proposed inquiry. "I cannot," I stated in my opinion, "suppress the remark that (1.) it nowhere appears from the documentary evidence that the hair examined has been actually that of the deceased. It also appears (2.) from the declaration of the accuser herself, that she had only given the hair to the apothecary for analysis after she had read in a book that arsenic had been found in the hair of animals poisoned with arsenic; and this is the more remarkable when we consider, (3.) that the sister of the accuser, in a letter to another member of the family, in which she very correctly states the position of affairs, calls her a person 'who will use every means to attain her end.'" According to this, the pretended fact, that H. has found arsenic in certain hairs given him by the accuser to be tested for arsenic, is not of the slightest medico-legal value. Moreover, the investigation itself has not been carried out with the caution requisite to permit of any correct opinion being based upon it, for not only has the Marsh's apparatus employed not been itself previously tested to prove it to be free from arsenic, but even the metallic stain obtained has not been chemically tested for antimony, to which even the arsenical stain has so great a resemblance, that it can only be distinguished from it by chemical analysis. And besides all this, my distinguished colleague, Privy-Councillor Mitscherlich, has been unable to find any trace of arsenic in the hair of the deceased, cut off after her death, which he received from her heir. When I further state, that there is no known instance of arsenic having been found in the hair of those who have been poisoned with it, and when I also state, that any arsenic present in the hair must have been there during life, and must of necessity have caused some vital reaction in the scalp, no trace of which was observed in the deceased, I think I have given sufficient reason for stating it to be my opinion that the investigation in question of hair said to be taken from the head of N. N., has given no further reason for supposing any truth to be in the statement that she has been poisoned with arsenic, and, therefore, an exhumation of the body now, after it has been buried above a year, and must be completely putrefied, cannot be productive of any result. The accuser and her accusation were alike dismissed.

CASE CLXXXVIII.—POISONING BY SULPHURIC ACID ADMINISTERED ONE HOUR BEFORE DEATH.

This case deserves to be related here, because the child only lived one hour after receipt of the poison, and we had before us at the autopsy a body not in the slightest altered by putrefaction. The criminal was the unnatural mother, who had poisoned her daughter, aged one year and a-half, with sulphuric acid; the child died within an hour after, in spite of the antidotes administered. The tongue was white and leathery, and had no acid reaction, and we also found the usual dirty-yellow parchment-like streaks (extending from the left angle of the mouth to the ear), arising from the trickling down of the corrosive poison, and similar stains were also found upon both arms and hands of the child, evidently from scattered drops of the poison. The stomach was quite grey, both externally and internally, and filled with a dark, bloody, acid mucus; its tissues fell to pieces when touched, the vena cava was moderately filled with a cherry-red syrupy and acid blood, and the liver and spleen were congested with blood of the same quality. The lungs were pale and moderately congested; all the cavities of the heart contained only a few drops of blood, and the veins of the thorax were but moderately filled. The trachea and larynx were empty and normal. The tissues of the œsophagus were in this case, as in most other similar ones, quite firm, and its mucous membrane was greyish-coloured, and had an acid reaction. The cranial cavity presented nothing remarkable.

CASE CLXXXIX.—POISONING BY SULPHURIC ACID, ADMINISTERED TWO HOURS BEFORE DEATH.

I found the most fearful effects of this poison, so destructive of every organic material, that can possibly be imagined in the body of a hat manufacturer, aged 30 years. This man had risen early and taken, in the dark—whether intentionally or accidentally was never learned—a good drink of crude sulphuric acid, such as is used in his trade. His wife, hearing him cry, ran to him, and sent off immediately for assistance. The physician who obeyed the call bled him, and the blood is stated to have flowed "syrupy" from the vein. After the administration of milk and soapy water, vomiting occurred several times, but death occurred within two hours. We found the whole of the tongue, from the extreme point backwards sphacelated, its mucous membrane here and there completely separated. Externally, the œsophagus displayed nothing anormal, internally, however, it, as well as the fauces, was of a greyish-black colour. On the other hand, the stomach was externally, as well as internally, of a coal-black colour, and, of course, so macerated and brittle that in only drawing it forwards the forceps tore it like wet blotting paper. Of course it was impossible to ligature it (as directed), and its contents were at once removed from the abdominal cavity. The great omentum was also for the most part carbonized, evidently because either during life or shortly after death the corrosive poison had perforated the stomach, and directly destroyed the omentum. The duodenum and the commencement of the jejunum displayed only a blackish-grey coloration. The mucous membrane, which could here be examined, was thickened, condensed, and looked as if boiled. The blood was entirely of the colour of cherry-juice, its consistence was that of thin syrup, with a few isolated coagula of the consistence of moist clay. All the other abdominal organs except those mentioned were not affected by the destroying agent, and were quite normal, affording proof that the corrosive poison had not had time during the two hours of life to penetrate to the lower bowels. The lungs and heart were quite normal, and they, as well as the cranial sinuses, were tolerably congested with blood. Although the chemical analysis of the contents of the stomach was quite unnecessary in this case, seeing that the fact of poisoning by sulphuric acid was already sufficiently made plain by the results of the dissection, yet it was instituted because it is so directed in the statutes. And from it it appeared that the stomach, its contents, the duodenum and œsophagus contained about three drachms (imp.) of anhydrous sulphuric acid.

CASE CXC.—POISONING WITH SULPHURIC ACID THREE DAYS BEFORE DEATH.

On the 9th of July, 18—, the boy S., aged 2½ years, drank an unascertained quantity of commercial sulphuric acid from a bottle; his mother, who saw that his lips, tongue and fauces were white, gave him some milk to drink, which was immediately brought up coagulated; he then got, from a surgeon, an emetic, which evacuated a "black mass;" he subsequently passed into the hands of a physician, whose treatment of the case was not mentioned in the documentary evidence, and he died upon the 11th of July, after three days' illness. The autopsy was made about five days after the taking of the poison, and the following are its most important results:—Putrefaction was already (in July) far advanced. The tongue was not swollen, and lay fixed between the teeth. The stomach, on the whole, was pale, only on its back part there was a purplish-red spot, half-an-inch in diameter, which immediately ruptured in attempting to bring it carefully forward. The examination of the posterior wall of the stomach from the interior brought to light a flat circular ulceration, two inches long and one inch broad, the colour of which did not differ from the rest of the stomach; that is, an erosion of the mucous membrane, such as is found in every case of poisoning with sulphuric acid where death is not immediate, but where sufficient time has elapsed to permit of the employment of proper medical aid. The mucous membrane of the œsophagus displayed many black points, but no true erosion. There was nothing else remarkable in the body, except

its general anæmia, which, however, could only be regarded as the result of its advanced state of putrefaction. The most careful investigation of the contents of the body did not reveal the presence of any inorganic acid, and, of course, of no sulphuric acid. Nevertheless, we did not hesitate to declare that the child had died of ulceration of the stomach, and that this had been produced by the swallowing of commercial sulphuric acid. It is evident that the characteristic burning of the mucous membrane of the mouth and fauces, the continuous vomiting of curdled milk, and of "black masses," as well as the discovery of the peculiar ulceration of the stomach, which is quite characteristic of this form of poisoning in a child which had been perfectly healthy up to the moment of swallowing the poison, were all circumstances which favoured this view of the case, while the mere fact of the non-discovery of the sulphuric acid in the body would not be accepted as any counter proof, since it was well known that the child had been medically treated, and had consequently received so-called antidotes. The whole sum of the evidence from the clinical history and post-mortem appearances, does not permit the assumption of any other supposition.

CASE CXCI.—POISONING WITH SULPHURIC ACID EIGHT DAYS BEFORE DEATH.

An illegitimate female child, seven weeks old, was poisoned eight days before her death by her mother, as she afterwards confessed, pouring concentrated sulphuric acid into her mouth. The usual symptoms followed. At the post-mortem examination the first thing that struck one was a part upon the left side of the neck, from which the entire skin was removed, so that the hard and leathery muscles were seen lying bare at the bottom of the wound. The edges of this sore were already granulating, and it was surrounded by a narrow red areola. The œsophagus was somewhat greyish-black in colour, and so disorganized that it tore on the slightest touch. The stomach was quite (remarkably) pale, and there was an ulceration (erosion) of the mucous membrane the size of a half-crown upon its anterior wall. The blood was dark and treacly. There were only a few true blood coagula in the right ventricle of the heart, and in the sinuses of the dura mater. The other appearances were unimportant. The liquid which had been confiscated, was found to be crude sulphuric acid. No trace, however, of this acid could be found in the contents of the

stomach or duodenum, and, in regard to this, we may mention that the child had carbonate of magnesia given it very soon after the poisoning.

CASE CXCII.—POISONING BY SULPHURIC ACID.

The suicide of a servant-maid, aged 19 (and already deflowered), presented a very remarkable example of poisoning with sulphuric acid. At the external inspection of the body the most striking points observable were the tongue, which protruded to the extent of one line from between the teeth, and two parallel streaks which ran from the middle of the under lip down to the chin, each ¾ of an inch broad, dark brown, and hard to cut, and which had evidently been caused by the running down of the sulphuric acid. On opening the body, the stomach was found perfectly black; after it and the duodenum had been ligatured and removed, we found a quart of dark-brown fluid, giving an acid reaction with litmus paper; the mucous membrane was also universally softened, and its surface coal-black. The omentum was also black, although the stomach had not been perforated. Liver, pancreas, spleen, intestinal canal, kidneys, urinary bladder, and the unimpregnated uterus displayed nothing anormal. Nine ounces of dark and very fluid blood were scooped out of the abdominal cavity. The vena cava contained only a small quantity of dark, very fluid, and acid blood. The whole of the left half of the diaphragm was of a deep black colour, such as I have never seen it in any other case. The lungs were healthy, and contained only the normal quantity of blood. The heart was flaccid, and almost empty of blood. The trachea was empty, and there was, therefore, not one single sign of death from asphixia present, and yet the tongue was protruded from between the clenched teeth (a similar condition was also found in Case CXC.). The appearances of the tongue and palate were quite unexpected, nothing unusual being found on either of them. On the other hand, the whole of the mucous membrane of the œsophagus was greyish-black in colour, and felt as if it had been tanned. The blood in the thoracic vessels precisely resembled that in those already described. The vascular cerebral meninges, and the brain itself, were unusually congested with dark and perfectly fluid blood. The cerebellum and all the sinuses were equally congested.

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CASE CXC.—POISONING WITH SULPHURIC ACID THREE DAYS BEFORE DEATH.

On the 9th of July, 18—, the boy S., aged 2½ years, drank an unascertained quantity of commercial sulphuric acid from a bottle; his mother, who saw that his lips, tongue and fauces were white, gave him some milk to drink, which was immediately brought up coagulated; he then got, from a surgeon, an emetic, which evacuated a "black mass;" he subsequently passed into the hands of a physician, whose treatment of the case was not mentioned in the documentary evidence, and he died upon the 11th of July, after three days' illness. The autopsy was made about five days after the taking of the poison, and the following are its most important results:—Putrefaction was already (in July) far advanced. The tongue was not swollen, and lay fixed between the teeth. The stomach, on the whole, was pale, only on its back part there was a purplish-red spot, half-an-inch in diameter, which immediately ruptured in attempting to bring it carefully forward. The examination of the posterior wall of the stomach from the interior brought to light a flat circular ulceration, two inches long and one inch broad, the colour of which did not differ from the rest of the stomach; that is, an erosion of the mucous membrane, such as is found in every case of poisoning with sulphuric acid where death is not immediate, but where sufficient time has elapsed to permit of the employment of proper medical aid. The mucous membrane of the œsophagus displayed many black points, but no true erosion. There was nothing else remarkable in the body, except

its general anæmia, which, however, could only be regarded as the result of its advanced state of putrefaction. The most careful investigation of the contents of the body did not reveal the presence of any inorganic acid, and, of course, of no sulphuric acid. Nevertheless, we did not hesitate to declare that the child had died of ulceration of the stomach, and that this had been produced by the swallowing of commercial sulphuric acid. It is evident that the characteristic burning of the mucous membrane of the mouth and fauces, the continuous vomiting of curdled milk, and of "black masses," as well as the discovery of the peculiar ulceration of the stomach, which is quite characteristic of this form of poisoning in a child which had been perfectly healthy up to the moment of swallowing the poison, were all circumstances which favoured this view of the case, while the mere fact of the non-discovery of the sulphuric acid in the body would not be accepted as any counter proof, since it was well known that the child had been medically treated, and had consequently received so-called antidotes. The whole sum of the evidence from the clinical history and post-mortem appearances, does not permit the assumption of any other supposition.

CASE CXCI.—POISONING WITH SULPHURIC ACID EIGHT DAYS BEFORE DEATH.

An illegitimate female child, seven weeks old, was poisoned eight days before her death by her mother, as she afterwards confessed, pouring concentrated sulphuric acid into her mouth. The usual symptoms followed. At the post-mortem examination the first thing that struck one was a part upon the left side of the neck, from which the entire skin was removed, so that the hard and leathery muscles were seen lying bare at the bottom of the wound. The edges of this sore were already granulating, and it was surrounded by a narrow red areola. The œsophagus was somewhat greyish-black in colour, and so disorganized that it tore on the slightest touch. The stomach was quite (remarkably) pale, and there was an ulceration (erosion) of the mucous membrane the size of a half-crown upon its anterior wall. The blood was dark and treacly. There were only a few true blood coagula in the right ventricle of the heart, and in the sinuses of the dura mater. The other appearances were unimportant. The liquid which had been confiscated, was found to be crude sulphuric acid. No trace, however, of this acid could be found in the contents of the

stomach or duodenum, and, in regard to this, we may mention that the child had carbonate of magnesia given it very soon after the poisoning.

CASE CXCII.—POISONING BY SULPHURIC ACID.

The suicide of a servant-maid, aged 19 (and already deflowered), presented a very remarkable example of poisoning with sulphuric acid. At the external inspection of the body the most striking points observable were the tongue, which protruded to the extent of one line from between the teeth, and two parallel streaks which ran from the middle of the under lip down to the chin, each ¾ of an inch broad, dark brown, and hard to cut, and which had evidently been caused by the running down of the sulphuric acid. On opening the body, the stomach was found perfectly black; after it and the duodenum had been ligatured and removed, we found a quart of dark-brown fluid, giving an acid reaction with litmus paper; the mucous membrane was also universally softened, and its surface coal-black. The omentum was also black, although the stomach had not been perforated. Liver, pancreas, spleen, intestinal canal, kidneys, urinary bladder, and the unimpregnated uterus displayed nothing anormal. Nine ounces of dark and very fluid blood were scooped out of the abdominal cavity. The vena cava contained only a small quantity of dark, very fluid, and acid blood. The whole of the left half of the diaphragm was of a deep black colour, such as I have never seen it in any other case. The lungs were healthy, and contained only the normal quantity of blood. The heart was flaccid, and almost empty of blood. The trachea was empty, and there was, therefore, not one single sign of death from asphixia present, and yet the tongue was protruded from between the clenched teeth (a similar condition was also found in Case CXC.). The appearances of the tongue and palate were quite unexpected, nothing unusual being found on either of them. On the other hand, the whole of the mucous membrane of the œsophagus was greyish-black in colour, and felt as if it had been tanned. The blood in the thoracic vessels precisely resembled that in those already described. The vascular cerebral meninges, and the brain itself, were unusually congested with dark and perfectly fluid blood. The cerebellum and all the sinuses were equally congested.

CASE CXCIII.—DEATH FROM POISONING WITH SULPHURIC ACID, AND NOT FROM STRANGULATION.

This case was peculiar (but not difficult to decide), since there was a suspicion, I know not from what cause, that the person concerned, a woman, aged 70 years, had been strangled. Round the neck of the body there lay a soft neckerchief, in which there were many gnawed-looking holes, which, both from their taste and appearance, seemed to have been produced by the corrosion of some mineral acid. The abdomen was already green from putrefaction. The mucous membrane of the mouth and tongue were not decolorized, but were easily stripped off. From the right angle of the mouth a brownish-red leathery stripe, ¼ of an inch in breadth, ran down to the collar-bone, a characteristic proof that some corrosive fluid had run down at this spot. On the neck there was no swelling of the veins, nor any trace of the mark of a cord to be seen. In the brain and cranial cavity there was no hyperæmia, the lungs were normal, the heart perfectly empty of blood, the larynx and trachea were quite free from froth, mucus, &c., and the mucous membrane only displayed the usual (brownish-red) colour of putrefaction; the mucous membrane of the œsophagus was quite grey, the liver was steel-grey and anæmic, the gall-bladder distended with gall-stones, the whole of the external surface of the stomach was blackish-grey, it had no contents, and its mucous membrane was universally of a grey colour; the whole of its tissues were extremely friable, and gave an acid reaction with litmus paper. Kidneys, spleen, and intestinal veins were anæmic, the vena cava was almost empty, the blood had a feeble acid reaction (the anæmia apparent in the body was obviously due to the putrefaction present). The chemical investigation proved that the holes in the neckerchief were due to sulphuric acid, and also determined the existence of free sulphuric acid in the stomach and œsophagus.

CASE CXCIV.—DISAVOWED SUICIDE FROM SULPHURIC ACID.

A strong healthy apprentice, aged 16, had declared, during his illness (why? was not known), that some one had given him sulphuric acid to drink instead of a dram. The circumstances that there were no marks of cauterization on the lips, and that the appearances on dissection betokened that no inconsiderable quantity had been swallowed, proved indubitably that this statement was untrue, and that his illness and death had been voluntarily induced. The tongue was white, and the epithelium easily scraped off The pharynx and œsophagus were grey, but their tissue still firm. The stomach was externally reddish-brown, black and gelatinous at its inferior curvature, where there was a perforation the size of a silver threepenny-piece, through which about a pound (imp.) of muco-sanguinolent fluid had escaped into the peritoneal cavity. The stomach, which internally appeared quite black, still contained about four ounces (imp.) of black grumous blood. The transverse *mesocolon* was also quite black, the intestines reddish, the urinary bladder empty; liver, lungs and heart remarkably anæmic; but, on the other hand, there was in this case also distinct congestion of the brain and cranial veins. The whole of the blood in the body was dark, syrupy, and had an acid reaction.

CASE CXCV.—MURDER BY SULPHURIC ACID VOLUNTARILY SUBMITTED TO.

This case was not less interesting psychologically than pathologically, and truly it is only in great towns that such cases are found. A girl, aged 20, was poisoned with sulphuric acid by her lover. He was a married man, and had slept the previous night in one bed with his wife and this girl his sweetheart! and both had, as agreed upon, taken advantage of the getting up of the wife, to drink sulphuric acid together. The girl stated that she had drank about two tablespoonfuls, the man somewhat less. The man had immediately spat out the corrosive poison, and was restored to health; the girl, however, died after five days' treatment in an Hospital, during which she had got *magnesia usta,* and had leeches applied to her neck and to the upper part of her abdomen; and we ascertained that during her illness she had repeatedly vomited blood. The tongue was perfectly normal, evidently it had become so during the course of the illness. The pharynx and œsophagus were, in this case also, grey but firm; the stomach was empty and black, and at its greater curvature it was very friable. The general anæmia of the whole body was easily explained by the repeated attacks of hæmatemesis and the defective nutrition during the last few days of life. The blood was of a dark cherry-red colour and treacly consistence, and presented in this case also an acid reaction in all the organs, which were healthy enough in other respects. It was also very remarkable to see how energetically the sulphuric acid had acted in withstanding the advance of putrefaction, since the body of the girl was still quite fresh, when dissected eight days after her death, and this though the temperature had been rather mild, viz., from + 2 to + 4 R. = 36°.5 to 41° F. The girl was also—not deflowered. Consequently this was a true case of Platonic love, strong enough to lead to an attempt at mutual murder! The chemical analysis in this case must be interesting. The stomach, the œsophagus, and pieces of the liver, spleen, and kidneys were submitted to analysis, which was obliged to be delayed for six days, after which those organs were no longer capable of reddening litmus paper, but, on the contrary, restored a faint blue to litmus paper already reddened, because an excess of ammonia was now present in the putrefying organs. As it was well known that the deceased had taken large doses of *magnesia usta*, and perhaps also of other alkaline earths, capable of neutralising free acids, we endeavoured to ascertain the presence of any remarkable amount of neutral sulphates in the organs mentioned. For this purpose, they were cut in pieces, repeatedly boiled in distilled water, and the decoction concentrated by evaporation in a water-bath. Nitric acid was then added to the solution, which was filtered and tested by a solution of nitrate of baryta; the result was a trifling white precipitate, which when washed upon a filter, dried, brought to a red-heat, and weighed, was found to amount only to ⅝ of a grain. The amount of sulphuric acid corresponding to this precipitate was far too small to afford any evidence as to the fact of this case having been one of poisoning with sulphuric acid, and yet this was very well known to have been the case, and was proved by the appearances on dissection! The analysis only proved the accidental presence of a trifling amount of alkaline sulphates in the organs of the body.

CASES CXCVI. AND CXCVII.—SUICIDE OF TWO PREGNANT WOMEN BY SULPHURIC ACID.

Omitting a great number of cases of poisoning with concentrated sulphuric acid, which are precisely similar to those already related, I will only further relate the two following cases, both of them relating to pregnant women, who had poisoned themselves with this corrosive acid. Both of these cases presented the peculiar acid reaction of the whole of the blood, which we have seen to have been constantly present in the cases already related, and which may be regarded as indisputably proved to exist in every case; in the second we made the remarkable discovery, that the *liquor amnii* also had an acid reaction. We had not thought of this when the first case occurred, and therefore, alas! neglected to test it.

(CXCVI.) A woman, aged 40, of whose illness and death we obtained no information. Milk could be expressed from both of her breasts. The mucous membrane of the lips was partially detached, the upper lip was of a dirty yellowish-brown and hard to cut; the tongue was whitish and uninjured. The lungs were livid, healthy, and anæmic; the heart was almost completely emptied of blood. The blood was also in this case of a cherry-red, but more fluid than usual, throughout the whole body it gave an acid reaction. The large venous trunks of the thorax were much distended; the trachea was empty; the œsophagus uninjured, but grey in colour. The stomach was greyish-black, distended with a blackish-brown fluid; on its anterior surface there were many erosions, the size of a pea, with black edges; its mucous membrane was coal-black and easily stripped off; the other tissues of the organ were still tolerably firm. The duodenum resembled the stomach in appearance, but there was nothing particular to be seen in the rest of the intestines. The liver was pale and anæmic, the gall-bladder full of dark bile. The other abdominal organs were only somewhat anæmic, and in the vena cava there was but little blood. The uterus, which, to judge from the development of the fœtus, must have been six months pregnant, was six inches long and five inches broad; its walls were half-an-inch thick. The fœtus, eleven inches long, was a well-formed male; the pupillary membrane was still present, and the scrotum was empty. The umbilical cord, which was wound round its neck, was nineteen inches long.

(CXCVII.) This girl, aged 20 years, had been already dead seven days in June, and we were not told how long she had survived the taking of the poison; the appearances on dissection, however, showed that death must have been very rapid, as the poisoning had been very acute. In this case also putrefaction was so little advanced that the abdominal coverings were only just beginning to turn green. A watery milk could be expressed from both breasts. The lips, which were hard to cut, were black, as were also the teeth; the tongue was greyish-black, and as if tanned. The acid had run down from both corners of the mouth, as was shown by the usual dirty-yellowish brown leathery streaks. The lungs were normal and anæmic, in the pericardium there was about one tablespoonful and a-half of a darkish brown acid fluid; the left side of the heart was moderately filled with remarkably firm and black coagula, which had an acid reaction; the right side of the heart was more distended, and contained a larger quantity of fluid blood mixed with similar coagula. The larynx and trachea were empty; the œsophagus was firm, but greyish-coloured. The stomach was entirely destroyed and metamorphosed into a pultaceous mass, which was more grey than black in colour; its contents, partly the remains of food and partly a dirty fluid, were very acid, made the hand smart, and were effused into the abdominal cavity. The liver was anæmic, the gall-bladder empty. The spleen, kidneys, and omenta were also anæmic. The intestines were empty, and grey in colour from the action of the contents of the stomach. The greyish-black uterus contained a fœtus, at the fourth month, which could be readily made out, by the aid of a glass, to be a male. The *liquor amnii* had a *decidedly acid* reaction upon litmus paper. The bladder was empty. The vena cava contained only a small quantity of coagulated blood. The meningeal vessels were congested with half-coagulated blood, the sinuses were, however, almost empty, although we had intentionally placed the body with its head hanging downwards for twenty-four hours before the dissection, which was not a judicial one.

CASE CXCVIII.—POISONING WITH DILUTED SULPHURIC ACID.

I include this case, because it was the first that came before us after the introduction of the new Regulations, by which, in order to prevent accidents, the apothecaries and shopkeepers of Berlin are forbidden to retail sulphuric acid, except when diluted with six times its bulk of water, and also, because of the careful analysis of the body, made by our present judicial expert, Dr. Hoppe. E., an unmarried woman, had, on the 4th of July, been induced by want to pour, intentionally, a teaspoonful of sulphuric acid thus diluted, down the throat of her six weeks' old child. On the same evening, a medical man found the child with very staring glistening eyes, with insensible pupils, distorted and anxious features, the mucous membrane of the tongue and lips thickened and white coloured, the pulse scarcely to be felt, the breathing difficult, and swallowing almost impossible, but there was neither vomiting, movement of the bowels, nor convulsions. He prescribed magnesia, but the child died about midnight. At the autopsy on the 6th, the following were the most important appearances observed:—In spite of the high atmospheric temperature, the body was still quite fresh, the tongue was whitish, with an acid reaction, the lips hard, and of a dirty-brown colour; in the abdominal cavity there was about six drachms (imp.) of dark, coagulated, acid blood, a similar quantity lay upon the omentum; the posterior wall of the stomach (and it alone) was of a dirty leaden-grey, and torn throughout its whole length, with irregular dirty bloody edges; the mucous membrane covering this wall was of the same leaden-grey colour, and its structure was quite unrecognisable. The liver was anæmic, the bile acid. The duodenum displayed exactly the same condition as the stomach, and this also extended for nine inches downward into the small intestines; the intestinal canal, urinary bladder, and vena cava were empty. The lungs, heart, and pulmonary artery contained no blood. The œsophagus was of a uniform pale grey, internally as well as externally; the mouth and fauces were also grey. The cranial cavity was anæmic.

The greater part of the stomach, of the small intestines, and of the œsophagus were rapidly cut in pieces, put into a porcelain vessel, covered with distilled water, and continually stirred till they boiled; then filtered, and the undissolved remains well washed with distilled water. The filtrate was rapidly evaporated in a water-bath to less bulk, a large quantity of absolute alcohol added to it, stirred round and filtered.

A. The alcoholic filtrate was evaporated to a small residuum in the water-bath, nitric acid was added to this already acid residuum, and a few drops of a solution of chloride of barium dropped into it. This addition caused only a slight haziness, which did not increase during twenty-four hours, and which, when filtered, dried on the filter, and ignited in a platinum crucible, was found to be perfectly imponderable.

B. That portion of the original residuum of the watery extract which proved insoluble in alcohol, was again dissolved in water, and decomposed by the addition of nitric acid and a solution of chloride of barium; then heated, and a solution of chloride of ammonium added to it, after which it was allowed to stand twenty-four hours, filtered and washed with distilled water; the filter, with its deposit, was then dried, and ignited in a platinum crucible. After deducting the weight of the ashes of the filter, the weight of the precipitate was found to be 0·6326 grain (troy) of sulphate of barytes, corresponding to 0·2158 grain (troy) of sulphuric acid.

c. That part of the original substances which was insoluble in boiling water, was dried in an oven at a temperature of 120° C = 248° F. The dry residuum weighed 28·6451 grains (troy); it was dissolved in nitric acid, and the solution of the chloride of barium added to it, which produced only a slight haziness.

The other and smaller portion of the stomach, the œsophagus and the small intestines were also rapidly cut in pieces, and a mixture of two parts of absolute alcohol and one of æther immediately poured over them, the vessel closed and allowed to stand fourteen hours, being often shaken during that period.

A. The filtrate was first evaporated at a moderate temperature in the water-bath, and then *in vacuo* over chloride of calcium; the thick, greasy residuum, which had an acid reaction, was treated with distilled water and filtered. The filtrate treated like that under A, presented similar conditions.

B. That portion of the original substances which was insoluble in alcohol, was stirred about in some cold distilled water, allowed to stand for some hours and then filtered, the filtrate was then acidulated with nitric acid, and precipitated with chloride of barium; the precipitate collected upon a filter, washed, dried, and ignited. In this way 0·1543 grain (troy) of sulphate of barytes were obtained, equivalent to 0·0524 grain (troy) of sulphuric acid.

C. The matters insoluble in water and in alcohol, were treated exactly as already mentioned under c. The weight of the dried substances amounted to 5·40 grains (troy). The ashes of this dissolved in nitric acid also gave only a slight haziness on being tested with chloride of barium. Consequently, we obtained from the fluids of those organs examined only uncertain traces of free sulphuric acid. On the other hand, there was in their substance an amount of sulphuric acid combined with bases equivalent to 0·2682 gr. (troy). That portion of the organs examined, which was insoluble in water or alcohol, amounted, when dried, to 34·0451 grs. (troy) in all. According to the best analyses, the relation which the sulphuric acid in combination with bases ought to bear to the albuminous and other components of the tissues insoluble in alcohol and water, is only as 1:1000, or at the very most as 2:1000. But, according to our analysis, the relation which the amount of sulphuric acid we found bore to those parts of the organs examined, when dried, was between

8 : 1000 and 10 : 1000. Therefore it appeared that these organs of the child contained an amount of sulphuric acid in combination with bases very considerably above the normal. Whether, however, this increased amount of sulphuric acid had been administered to the child as free acid or in combination, in the form of some innocuous salt, could not be decided by our analysis alone.

CASE CXCIX.—POISONING SAID TO BE BY INK.—DILUTED SULPHURIC ACID?

Most probably the deadly fluid had been in this case diluted commercial sulphuric acid, discoloured by the presence of some carbonized organic matter (as cork). In spite, however, of the most careful chemical analysis, directed both for the discovery of inorganic and organic poisons, the case could not be cleared up. The perfectly fresh body of this male child, aged nine months, regarding whose illness we had no information, was emaciated and anæmic. The mucous membrane of the tongue was white, softened, and easily scraped off, that of the fauces similar, but in a less degree; both had an acid reaction. The liver was pale-yellow. The stomach was three-parts filled with a fluid like groat-gruel, which was acid; its mucous membrane was gelatinous and easily scraped off; its tissues were pale, a few blue venous cords upon the smaller curvature, and some washed out like brownish-red stains upon the fundus were cadaveric phenomena. The duodenum and the commencement of the small intestines were precisely like the stomach; the large intestines were empty; the rest of the abdominal organs perfectly normal; the vena cava contained a small quantity of treacly, cherry-red blood. The heart contained no blood; the œsophagus was normal; its mucous membrane firm, normal, and not in the least softened; the trachea was pale and empty; the whole of the cranial cavity was anæmic. The autopsy therefore could only point to a suspicion of poisoning by sulphuric acid, and scarcely even to that. The fluid contents of the stomach were tested for organic and inorganic poisons, but without result. Sulphuric acid, phosphoric acid, and potash were certainly found, but not in any greater quantity than they are usually present normally in the tissues. Since, however, sulphuric acid is so very readily and rapidly saturated and diffused as a salt throughout the fluids of the body, and as this also occurs rapidly in the case of phosphoric acid, and specially so in that of potash; so, indeed, the results of the chemical analysis pointed equally to the possibility of poisoning having occurred by sulphuric acid, phosphoric acid, or potash, though either might be considered as certainly improbable. The strongly acid reaction of the gastric fluids was found to depend upon acetic and lactic acids; these might both have been ingested with the food, or they might have been the products of fermentation, but they could not have been set free by the ingestion of sulphuric acid, since acetates do not appear to exist in the human body. The actual existence of fermentation was also evinced by the visible development of bubbles of carbonic acid gas. The gelatinous tumefaction of the gastric mucous membrane might also be produced by acetic or lactic acid. Accordingly, we could only state with certainty that in all probability the child had not been poisoned at all; whereupon the Judge dismissed the case.

CASE CC.—POISONING BY CHERRY-LAUREL-WATER.

I regret very much that I no longer possess the complete and accurate data of this case; all the other cases which I have related or shall yet relate, have without exception been extracted from official documents, but in this one I only possess a few notes of the autopsy. A man, aged 60 years, had, one forenoon, from *tedium vitæ*, swallowed about two ounces of our officinal *Aq. Lauro-cerasi*, to judge from the empty bottle which stood before his sofa. He fell immediately into a kind of swoon, and was at once attended to and placed under observation. He vomited an apple which he had eaten shortly before, and was laid upon the sofa, where I found him about an hour after. He lay quite still in a half recumbent posture, with his head so dependent that one required to stoop in order to look into his face. His countenance was pale, and his whole body cool, his pupils much enlarged. His pulse was slow, soft, and very irregular. The most remarkable circumstance about him was the existence of a complete paralysis of motion, so that not a single voluntary muscle could be moved. Consciousness seemed not to be lost, but this could not be ascertained with certainty, since the patient could neither speak, put out his tongue, give his hand, nor evince any emotion by any play of features whatever. From time to time the most fearful convulsions passed over the countenance of this all but lifeless body, distorting its features most horribly. It was impossible for him to swallow, and therefore only external excitants could be applied. In the afternoon, about five hours after swallowing the poison, the unfortunate man died. The dissection was made about 24 hours after death, and the rapid advance of putrefaction was even then (in May) remarkable, as was also the strong smell of bitter almonds given forth by the body, and which was most unmistakeably recognised both by myself and by the others who stood around. The blood in the body was dark and remarkably fluid, and a congested state of the brain and of the right side of the heart were the most striking appearances found at the autopsy.

Case CCI.—Poisoning with Prussic Acid.

A Pharmaceutist had poisoned himself with prussic acid mixed with nitrous æther. Whether very flat feet, or a white swelling of the right knee—discovered at the dissection—had been the cause of this suicide, or whether there were any other cause, was not known. The pupils were remarkably contracted. The putrefaction had in two (December) days already advanced to peeling of the cuticle, and had therefore been extremely rapid. Cadaveric stiffening was still to be felt at individual parts. The stomach externally displayed the usual dirty-reddish colour of putrefaction; it contained about four ounces (imp.) of a blood-red, watery, and decidedly alkaline fluid; the surface of its mucous membrane was of a dark cherry-red at the fundus (effect of putrefaction!) and in the less deeply-coloured portions a few bright-red points could be seen. The orifices of the stomach were quite normal. The fluid contents of the stomach and the stomach itself gave forth an unmistakeable ethereal odour mixed with that of bitter almonds. The liver was normal and contained a moderate quantity of dark fluid blood; the gall-bladder was full. The small intestines, the mesentery, and the kidneys were very much congested, and the venæ cavæ still more so with similar blood. The urinary bladder contained about a tablespoonful of urine, the spleen was normal. The lungs and the large thoracic vessels contained only a moderate quantity of blood. The right ventricle contained about a tablespoonful of a similar dark fluid, its other cavities were empty. The larynx and trachea were normal. The œsophagus was of the normal hue, but displayed upon its mucous surface a few bright-red scattered stains, and also gave forth the twofold odour already described. The whole of the cranial cavity was in this case anæmic.

Case CCII.—Poisoning with Prussic Acid.

In one of the large hotels of this city (Berlin) a stranger was found dead one morning in bed, and near him a medicine bottle, capable of containing from four to five ounces, and labelled with the word "poison" and a death's-head, in accordance with the Prussian medical regulations. How much of this had been swallowed, and whether the deceased had died immediately, was, of course, unknown, as the quantity originally contained in the bottle could not be learned. We performed this most interesting autopsy of the body of the deceased, aged forty-eight years, on the third day after death, in November, the temperature having ranged from 0° to 5° R = 32° to 41° F. The cadaveric stiffening was still present, and the body quite fresh (wherefore also (*vid.* p. 63, Vol. II.) the roots of the hair were still firm!); the umbilicus alone was green-coloured. Immediately after removing the calvarium, which was remarkably thin, I, as well as all my pupils present, distinctly remarked the strong odour of bitter almonds. The vascular meninges and the sinuses were remarkably anæmic. On the other hand, the lungs were much congested, with very dark-red, almost black, blood, that was frothy from cadaveric œdema. In the right side of the heart, which was also much congested, the blood was treacly; microscopically examined, the blood-corpuscles were not found to deviate from the normal. The left side of the heart was empty; the pulmonary artery was, however, distended. The trachea and œsophagus were empty and normal. The liver healthy and anæmic, the gall-bladder full; the spleen friable and easily torn. The stomach, which was, alas! quite empty (so that any chemical analysis of its contents was out of the question), developed a strong smell of bitter almonds. Its mucous membrane displayed the dirty-brown colour of putrefaction and also cadaveric hypostasis; and this early putrefaction of the stomach was all the more remarkable from its complete non-existence in those organs which usually putrefy earlier. Still more striking than the early putrefaction of the stomach, was that of the kidneys—organs which are usually so late in putrefying, and which were of a uniform dark dirty-brown colour. The omenta, mesenteries, and abdominal coverings were all unusually fat. The intestinal canal was moderately full, and displayed nothing anormal. The urinary bladder was empty, the vena cava quite distended with blood similar to that already described. The blood was analysed, but prussic acid could not be detected in it. That death had, however, been caused by this poison could be assumed with certainty from the specific and unmistakeable odour developed by the body, because this presupposes in every such case the ingestion of such a quantity of the poison as could not have been given medicinally, and of necessity must have proved fatal. (Of course this happened before the days of nitro-benzin, *vid.* p. 50, Vol. II.)

CASE CCIII.—POISONING BY PRUSSIC ACID AND ETHEREAL OILS. —A SWEET-SMELLING BODY.

The heading of this case, which is perfectly correct, sufficiently testifies that I have here to describe one of the most remarkable cases that ever came before me on the dissecting table. Poisoning by prussic acid is somewhat rare, but poisoning by ethereal oils is almost unheard of, especially when swallowed to such an amount and in such variety as in the unique case before us. The interest of the case is also heightened by its having given occasion to our skilful chemist, Apothecary Schacht, to detect prussic acid in the blood. It therefore deserves to be fully narrated:—

S., aged 43, the wife of a vinegar and brandy distiller and rectifier, had been for many years excessively given to drinking, and in her case it had developed to actual "dipsomania." For, according to the statements of the witnesses, she was "for weeks or months perfectly sober," and then began again to drink so that for days she would lie quite drunk. One of these periodic attacks came on about the 6th of July, 18—, upon which day she was already seen quite drunk, and for several days following she continued so. On the 11th her husband left his dwelling early, and asked a neighbour to take charge of his drunken wife. In a desk and standing on a table in his house, there were fifteen phials of ethereal oils, such as S. employed in his business, viz., oil of cloves, oil of cummin, oil of peppermint, oil of lemons, &c. There was among these a phial of oil of bitter almonds, properly labelled as "poison." The neighbour mentioned, who had several times during the day visited S. and always found her very drunk, had refused to bring her more drink when requested, but had given her a "sour cucumber" to quench her thirst, came again about three o'clock in the afternoon and found S. lying dead in the kitchen, half a cucumber in one hand and a water jug in the other. On the 13th, two days after death (in July), we made the medico-legal examination of the body. The belly had a faint green colour. The tongue lay between the teeth, its point protruding; the hair was easily pulled out; there was no cadaveric stiffening present. The *sweet odour* diffused by the corpse was quite remarkable, and was observed by all present, the legal officials, myself and students, and this led us to suppose that she must have swallowed some sweet-smelling fluids either in large quantities or in a very concentrated form, though at that time all that we knew was that the woman had drunk the contents of several phials belonging to her husband. After the removal of the calvarium, all present were at once struck by the distinct odour of bitter almonds. The vascular meninges contained only a moderate amount of blood. After throwing back the dura mater, the smell of bitter almonds mixed with that of cloves and other spices was distinctly perceptible. There was nothing anormal in any part of the brain, the sinuses contained but little blood. The thorax, when opened, also diffused an aroma of almonds and spices, that of cloves prevailing over the odour of the other spices in all parts of the body. Both lungs had been long adherent, they were œdematous and very strongly congested with a cherry-red treacly blood. In the pericardium there was only the usual amount of fluid, the heart was flabby, its right side distended with cherry-red watery blood, the left side was almost empty, the large venous trunks were also distended with similar blood. The mucous membrane of the trachea was of a light brownish-red (putrefaction) colour. The œsophagus was normal and empty, and in it the smell of bitter almonds was most remarkable. The stomach externally did not deviate from the normal, but on opening it such a powerful aroma of bitter almonds came forth *as almost to stupify every one present.* It contained about three ounces of a reddish fluid. The whole of its mucous membrane was of a purplish-red, with isolated deeper stains scattered over it, but incisions into these proved that they were not ecchymoses. The fatty (drunkard's) liver was anæmic, the gall-bladder distended. The vena cava was much distended; all the other abdominal organs displayed nothing remarkable.

As regards the chemical analysis of the contents of the stomach and of the blood, its results were so interesting and important, prussic acid being most unmistakeably discovered in the body, and particularly in the blood, as seemingly to justify me in giving the exact words of the official report which was given in by Schacht and myself, and which, moreover, does not readily permit of any condensation.

"In the case just mentioned, the following articles were handed to us on the 13th inst.

I. A medicine phial, capable of containing about four ounces (imp.) labelled "*Oil of Bitter Almonds*," and marked "*Poison*," as usual. It contained about half-an-ounce (imp.) of a clear yellow fluid, and was sealed with the police commissary's seal.

II. A jar covered with paper, sealed, &c., and marked "Œsophagus, stomach and its contents of Mrs. S."

III. A jar covered with paper, sealed, &c., and marked "Jar found in S.'s house under the sofa, containing a sour cucumber."

IV. A six-ounce medicine bottle, labelled "Blood from the body of Mrs. S." It contained about one ounce (imp.) of light-red semifluid blood, and was sealed, &c.

V. An eight-ounce medicine bottle, sealed, &c. It contained about 12 drachms (imp.) of a faint-yellowish, almost transparent, fluid.

On opening these articles, the seals of all were found uninjured. What was required of us was as follows:—

(1.) To determine whether the phial marked I. contains prussic acid?

(2.) Whether the contents of the jar marked II. contains oil of bitter almonds, and therefore prussic acid?

(3.) Whether the sour cucumber in jar marked III. contains in its sauce any dangerous mineral matter?

(4.) Whether prussic acid can be detected in the blood in the bottle marked IV.?

(5.) If possible, to tell what is in the bottle marked V.

These various questions we have endeavoured to answer by means of the following analyses:—

ad I. The smell, appearance, taste, and specific gravity of the fluid contained in this phial proved it to be ethereal oil of bitter almonds. We shook up a small quantity of it with some aqua potassæ, allowed it to settle, and pouring off the supernatant fluid, we added to it a solution of the combined proto- and persulphate of iron, adding some muriatic acid; a *dense and beautifully blue precipitate* proved the presence of prussic acid, and of course of cyanogen in the oil in question.

ad II. The contents of this jar were the organs mentioned and a muddy-reddish fluid, both of which diffused a powerful aroma of bitter almonds. We separated the fluids from the solids, put the first into a tubular retort, cut the stomach and œsophagus into small pieces, stirred these about in distilled water, expressed all the fluids, and performed in this manner three times, only that the second time we added a small quantity of spirit of wine, and the third time a little more of it. We thus removed almost all of the strong odour of bitter almonds from the organs. The fluids expressed were added to the contents of the retort, a little officinal phosphoric acid poured in, and the mixture submitted to distillation. This was carried on by means of a bath of chloride of calcium, and with the aid of a Liebig's refrigeratory till about three ounces and a-half (imp.) of a colourless transparent fluid, smelling strongly of bitter almonds, had passed over. This displayed the following reactions:—

(*a.*) Treated with aqua potassæ, a solution of the proto- and persulphates of iron and hydrochloric acid; this fluid became of a dark-green, and speedily let fall a bright-blue deposit.

(*b.*) After the addition of two drops of hydrosulphuret of ammonia, containing a slight excess of sulphur and one drop of caustic ammonia to about two drachms (imp.) of the distillate, it was heated till all colour and smell had disappeared, and, on the addition of a little perchloride of iron, an intense blood-red coloration took place from the production of the sulphocyanide of iron.

(*c.*) Nitrate of silver with an excess of nitric acid produced a white precipitate, which was slowly deposited after the fluid had been well shaken.

The distillate therefore contained *prussic acid.*

ad III. The sour cucumber and its sauce were tested in the ordinary way for injurious metals and earths, but none were found. From the negative result obtained, we believe ourselves justified in not entering into particulars as to the methods followed.

ad IV. The blood, with the addition of a small quantity of spirits of wine and phosphoric acid, was put into a similar, but smaller apparatus, as was used *ad* II., and the distillation carried on from a bath of chloride of calcium, till about two drachms (imp.) of a colourless transparent fluid, smelling slightly of bitter almonds, had passed over. This was divided into two parts, and tested as under II., letters (*a.*) and (*b.*). The reactions with both of these tests were *quite distinct,* though no doubt *fainter* than in the former case.

ad V. The fluid contained in this bottle was strongly alkaline, smelt strongly of ammonia; evaporated in a platinum spoon, it left but a trifling amount of blackish residuum, which on the application of stronger heat itself disappeared, leaving no trace of ash behind. It gave no reactions either with hydrosulphuric acid, or with hydrosulphuret of ammonia, and must be considered as diluted spirit of ammonia, which had got slightly discoloured by cork or some other organic substance.

The results of our analyses are therefore :—

ad I. This phial contains essential oil of bitter almonds in combination with prussic acid.

ad II. The contents of the stomach of the deceased contained *prussic acid* in combination with the essential oil of bitter almonds, for prussic acid by itself never has so powerful an aroma.

ad III. The sour cucumber and its sauce contained nothing injurious.

ad IV. Prussic acid was distinctly found in the blood of the deceased.

ad V. This bottle most probably contains dirty spirits of ammonia. Our opinion in this case was not beset with any difficulties. It was shown that the inflammatory products in the stomach pointed to the injection of some powerful burning, or irritating matters, while the hitherto unheard-of phenomenon of a corpse smelling sweetly of various spices, as this one did, pointed to the fact, that these matters had been sweet smelling essential oils. These indubitably belong to the category of "substances fitted to injure the health" (§ 197 of the Penal Code), are, therefore, poisons, and experience indeed teaches us, that they are most powerful poisons. We must, therefore, assume that the deceased has died from the effect of these poisons. But another still more virulent poison, viz., the prussic acid, which we found, has actually poisoned the deceased, and indubitably very rapidly, as is proved by the position of the body in the kitchen with the drinking-jug in her hand. We must, therefore, hold it as proved, that S. has been poisoned partly by essential oils, and partly by prussic acid, and that the latter has caused her death.

CASE CCIV.—POISONING WITH PRUSSIC ACID.

In this instructive case also, the prussic acid was unmistakeably detected in the blood by our present medico-legal expert, Dr. Hoppe. An apothecary, some 20 years old, poisoned himself on the 14th of June. The body was very speedily brought to the cool deadhouse belonging to our Institution, and in spite of the high atmospheric temperature, + 20° R. = 77° F., we found it still fresh on the 15th, at noon. The rigor mortis was just commencing, the body was of the usual colour, and had the usual post-mortem stains upon its back. The slightest pressure on the urethra caused a drop of fluid to exude, resembling in appearance the seminal fluid, and which actually contained spermatozoa. On opening the cranial cavity, a strong odour of bitter almonds was instantly perceived by all the bystanders. The meninges were anæmic, the brain violet from imbibition (commencing putrefaction), the lateral ventricles contained a considerable amount of bloody serum, the sinuses were only moderately congested. The whole blood in the body was unusually fluid, violet-red in colour, and the blood-corpuscles perfectly normal. The trachea was empty and displayed the commencement of putrefactive imbibition. The odour of the bitter almonds became yet stronger on removing the breastbone. In each pleural cavity there was about three ounces (imp.) of bloody serum, the lungs were unusually hyperæmic, and only displayed the usual amount of (cadaveric) œdema. The pericardium was strongly adherent to the heart all round, the left side of the heart was quite full, and the right side of the heart and the pulmonary artery perfectly distended with blood, similar to that already described, in which, however, there were here a few coagula. The liver was congested, the gall-bladder quite full. The stomach was ligatured and removed, externally it seemed quite normal, it contained about an ounce (imp.) of decomposed bloody fluid, which smelt strongly of bitter almonds, and this odour was still more powerfully exhaled by the mucous membrane of the stomach, which was much softened, and wholly of a purple-violet colour, plainly from cadaveric imbibition, since, even with the most powerful glass, no trace of vascular injection could be discovered. The venæ cavæ (and also the urinary bladder) were much distended; the intestines, spleen, and kidneys displayed nothing unusual. Water was added to the contents of the stomach and the blood, this was acidulated with a few drops of sulphuric acid, and distilled with a gentle heat. Because, however, of the violent ebullition of the mass and the lumpy coagulation of the blood, a small quantity got spirted into the receiver; the fluid was therefore rapidly poured off the blood coagulum into a fresh retort and carefully distilled. The distillate had an exceedingly feeble odour of prussic acid; one portion of it was rendered alkaline by means of aqua potassæ, and to it a small quantity of a solution of the sulphate of the protoxide and peroxide of iron was added, this mixture was then strongly acidulated with hydrochloric acid, and upon this it became of a faint-blue colour, depositing within twelve hours a bright-blue precipitate of the sesquiferrocyanide of iron. Another portion of the distillate was evaporated in a water-bath with a small quantity of hydrosulphuret of ammonia (containing a slight excess of sulphur), and then decomposed by the addition of a drop of the perchloride of iron in a little hydrochloric acid, and the beautiful fiery-red colour, the certain sign of the presence of the sulphocyanide of iron, was immediately developed. The presence of prussic acid unchanged in the blood was therefore demonstrated. There was, nevertheless, no trace of it found in the urine, which was, however, distinctly albuminous, a remarkable fact, supposing the deceased not to have previously suffered from albuminuria. There was no sugar in the urine. The violet-coloured blood did not become of so beautiful a scarlet as normal blood does when shaken up with atmospheric air. Since the distillation of the contents of this stomach, which were *not* decomposed with acid, afforded so considerable a quantity of prussic acid, it was to be supposed that the poison employed had not been cyanide of potassium, but free prussic acid.

Case CCV.—Poisoning by Phosphorus.

The accusation in this case pointed to murder. An actress, aged 16 years, had agreed with her sweetheart, by whom she thought herself with child, which was not the case, that they should die together, and both had swallowed some of the ordinary phosphoric paste which her sweetheart H. had procured and given her. She died very speedily; H. was very slightly unwell, probably because he had swallowed little or none of the mixture, and he was placed under arrest. In regard to the illness of the deceased, it was only ascertained that she became ill early on the morning of the 4th of December, and vomited several times, and that a witness, who had gone into her room with warm milk, thought the room "smelt like lucifer matches;" in her presence the sick girl vomited a portion of the milk, and at four in the afternoon she found her dead. On the third morning after death we made the medico-legal dissection. On the abdomen the signs of commencing putrefaction were already present. The liver, spleen, and pancreas were perfectly normal; the veins of the omenta and mesenteries tolerably full; the small intestines were of a bright red, from visible vascular injection; the kidneys, the empty urinary bladder, and the unimpregnated uterus, were perfectly normal; the vena cava was filled, but not excessively, with dark, treacly blood. The stomach was externally pale, and presented nothing remarkable; it was quite empty; on its mucous membrane there were here and there a few small yellowish particles to be found; it was nowhere ulcerated or destroyed, excoriated, or softened, and least of all perforated, and was wholly of a reddish-yellow colour. The lungs were perfectly healthy, and contained only the normal amount of blood; the large vessels contained but little of the blood as described; there was still a portion of the thymus gland, one inch in diameter, remaining;* the heart, its cavities and coronary vessels were all almost entirely empty of blood; the mucous membrane of the trachea and œsophagus was perfectly normal. The meningeal vessels, the cerebral substance and the sinuses were all hyperæmic.

So negative a result of the dissection was not to be expected in the case of a poison acting so rapidly as phosphorus. However, the chemical analysis demonstrated unequivocally the presence of phosphorus in the body. The stomach, placed in a porcelain dish and heated, gave forth glittering sparks on being stirred about in a dark place, and by this alone the presence of phosphorus in substance in the stomach was proved. We endeavoured, however, to separate the phosphorus mechanically, and succeeded in the following manner:—The stomach was cut into small pieces, each piece carefully washed in water, and the washings collected. There was found in these a small deposit of particles of fat and flesh and of a yellowish-white powder; the latter being collected, gave forth, on being rubbed on any hard substance, the odour and vapour of phosphorus. We separated by washing the lighter particles of fat and flesh from the heavier pulverulent deposit, collected the latter with some fluid in a glass tube, in which it was heated by means of boiling water; it was then allowed to cool, and poured out upon a flat plate. The fat had collected in solid discs on the surface of the fluid, whilst at the bottom there was a small transparent yellow mass, which we easily recognised to be phosphorus by its physical properties. Although we had thus unequivocally proved the existence of phosphorus in substance in the organs examined, we yet continued the investigation as follows:—The cut pieces of the stomach and their washings were put into a tubular retort in a water bath, and about an ounce and a-half (imp.) distilled over. During the distillation, white fumes were continuously developed from the fluid; the colourless distillate had a cadaverous smell. A solution of nitrate of silver produced no precipitate; on being heated the fluid became brown, and a trifling brown precipitate was slowly deposited. With a solution of bichloride of mercury there was no reaction. The remainder of the fluid, about thirteen drachms (imp.) we mixed with nitric acid, heated the mixture in a porcelain vessel, and divided it into two portions. The one portion was evaporated to dryness, the residuum was ignited, then dissolved in a few drops of water, put into a watch-glass, and a few drops of a solution of caustic ammonia and of nitrate of silver added to it: a trifling white deposit resulted. The other portion was evaporated to dryness and dissolved in water, without any previous ignition; it was treated in like manner, and the result was a yellow precipitate. By all these experiments the presence of phosphorus in substance in the organs examined was most unequivocally demonstrated. The greater portion of the blood set aside for examination was accidentally lost; the rest of it had the same smell as the blood of animals poisoned by phosphorus, and the alteration of its organic constituents, particularly the blood-plasma and corpuscles, were also similar. It was not coagulated, and contained no coagula; the plasma was, therefore, as we may say, paralyzed; it was of a cherry-red arterial colour, not turbid when viewed by transmitted light as blood usually is, but transparent, as in every case in which the colouring-matter has been dissolved out of the corpuscles, whereby they become transparent. It was, moreover, syrupy from the quantity of colouring-matter it contained in solution. The microscope displayed in the clearest manner perfectly colourless crystalline blood-corpuscles, within which the nuclei could be distinctly seen to shine as when the colouring-matter has been artificially washed out of them. The phosphorus paste from the apothecary's shop whence it had been obtained contained in the three ounces (imp.) retailed about ten grains of phosphorus. In the tenth part of this—that is, in about two heaped teaspoonfuls, there would therefore be about one grain of phosphorus contained. Since, however, the deceased had determined on her death, it was probable that she had swallowed more than two teaspoonfuls of the mixture, and at any rate a dose, which, taken at once, was amply sufficient to explain the death of this young and healthy person. In accordance with these results we were justified in considering the fact of the poisoning by phosphorus as proven.

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* In the following cases, I have found the thymus gland, or a considerable portion of it, still persistent even at a tolerably advanced period of life:—(1.) In the case of a boy, aged five, said to have been poisoned by water-hemlock, the thymus gland was still "very large;" (2.) In a boy, aged six years, killed by an injury of the head, the gland was still two inches long; (3.) In a boy, aged seven, burned to death, it was the size of a walnut; (4.) In a boy, aged seven, killed by being driven over (Case CXIII.), it was one inch and a-half long; (5.) In a boy, aged nine, buried alive, it was still "very large;" (6.) In a boy, aged fourteen, killed by his insane father, it was one inch and a-quarter long; (7.) In a boy, aged fifteen, shot at target-shooting—(a German festival like our New Years' Day prize-shooting, or rifle competitions.—Transl.)—one inch long; (8.) The case of the actress, given above; (9.) In a young man, aged sixteen, who was drowned, it was one inch and a-half long; (10.) In a young man, aged eighteen, who was hanged, it was two inches long; (11.) In a young man, aged nineteen, who was buried alive, it was one inch long; (12.) In a young woman, aged twenty, the remains were very perceptible; (13.) In a workman, aged twenty, who had shot himself, it was three-quarters of an inch long; (14.) In a young man, aged twenty-two, poisoned by alcohol, the remains were quite perceptible.

CASE CCVI.—POISONING BY PHOSPHORUS.

This was a most interesting case, as well in respect of the behaviour of the person killed by this fearful poison, during the short period she survived the taking of it, as also in regard to the phenomena discovered in the body. A well-educated Polish lady, aged 20, took, at six o'clock on the evening of the 16th of August, at *least three grains of phosphorus,* in the form of the officinal electuary. Those around her remarked nothing particular. During the evening she wrote a petition to the king!! Later in the evening she seemed to her family to exhale "sulphur" by her mouth (evidently confounding the vapour of sulphur with that of phosphorus-matches), and she complained that the light blinded her. She made *no* other complaint, particularly no complaint of pain; she passed the night, however, sleepless, constantly denying that "she had taken anything." She vomited *once* during the night, and died quite peacefully at six o'clock in the morning, just twelve hours after taking the poison. Forty-eight hours after death we dissected the body, the temperature being + 15° R. = 65°·7 F.

The body was sent to our dead-house on the previous evening, and greatly astonished every one by exhaling luminous vapour from its vagina! Next morning, before commencing the dissection, we, and all the other by-standers were surprised to see a greyish-white vapour smelling strongly of phosphorus continuously streaming from the anus! A very distinct odour of phosphorus also came from the mouth, but without any visible vapour. A slight amount of cadaveric stiffening was still present; the abdomen was green from putrefaction. Over the small curvature of the stomach the veins coursed like livid red cords (symptom of putrefaction). The stomach itself diffused no odour of phosphorus; no part of its mucous membrane was either softened or corroded; but on the fundus, as well as about the middle of the small curvature, there were many isolated hæmorrhagic effusions crowded together, each about the size of a pin-head; the upper patch was about one inch and a-half, and the under one about half-an-inch in circumference. The stomach contained about six to eight ounces (imp.) of a bright, bloody-looking fluid, mingled with coagulated milk. Particles of phosphorus could not be detected in the stomach even with a magnifying glass. The intestines were pale, and displayed nothing anormal either externally or internally; the large intestine contained fæces (the deceased was well known never to have had even a single motion, to say nothing of a diarrhœa, after taking the poison). The blood was dirty-red, of a syrupy consistence, and under the microscope resembled precisely the blood as described in the immediately preceding case. The liver was hyperæmic, the gall-bladder half full. The spleen was very full of blood. Both kidneys were already somewhat brownish-red, from commencing putrefaction, and remarkably hyperæmic. The urinary bladder was of an extraordinary livid colour, and contained about a tablespoonful of milky urine. The uterus was menstruating, its os was of the usual virgin transverse form. The vena cava contained only a small amount of blood. The lungs were beautifully marbled, contained but little blood, but exhibited a well-developed hypostasis. In the pericardium there was a tablespoonful of bloody serum. The heart was almost completely empty; the large blood-vessels, however, contained much blood. The larynx and trachea were empty, and their mucous membrane had not the dirty-brown colour of putrefaction, but was of a bright purplish-red, with a fine linear vascular injection clearly distinguishable by the aid of a glass. The œsophagus was empty, and quite normal. The meninges were moderately congested, and the brain contained more blood than usual; the plexus choroidalis was livid, the individual parts of the brain were normal, and the sinuses almost empty.

The peculiar exhalation of phosphoric vapour, and of the odour of phosphorus which distinguished this case rendered it one which could be easily and certainly decided without any chemical analysis. This was, however, impossible in the following case.

CASE CCVII.—POISONING BY POISONOUS MUSHROOMS.

A whole family were seized with vomiting and diarrhœa after a marriage-feast, consisting of a dish of fish with mushrooms, roast goose and veal; all recovered except one woman, aged 70, who died after labouring for three days, according to the certificate of the physician in attendance, under "the symptoms of gastro-enteritis." At the dissection, we found old adhesions of the lungs and a dropsical tumour (cyst) of the right ovary the size of a fist; these, however, had no connection with the fatal result. The only other remarkable appearances were the reddish colour of the small intestines, which did not extend to the large ones, numerous ecchymoses beneath the mucous membrane at the fundus of the stomach and on its posterior wall, and the dark colour of the blood, which was also very fluid. The stomach contained about an ounce-and-a-half (imp.) of a reddish fluid. The right side of the heart was distended, the left well filled. All the other appearances were perfectly normal. The chemical analysis only ascertained the absence of every noxious or metallic or earthy substance, and of all those vegetable poisons that can be detected. The mushroom poison, which may have been the cause of death, could not of course be detected; meanwhile, it must ever remain uncertain whether it was the mushrooms, the fish, or roast meats, or any other thing taken at the feast, that produced the symptoms of poisoning.

CASES CCVIII., CCIX., AND CCX.—THREE CASES OF POISONING BY ARSENIC AND BRUCINE.

The following interesting cases were very striking examples of what I have already spoken of, for every circumstance connected with them was in favour of the three children having been poisoned (by rat-poison), yet the ignorance and uncertainties which prevailed in respect to the symptoms produced by a poison so little known, the very trifling pathologico-anatomical alterations found in the bodies, and the fact that no poison could be detected in them, made it impossible, consistently with prevailing dogmas, to assume the fact of this poisoning "with certainty." For these reasons it was not to be wondered at that the advocate for the defence procured another medico-legal opinion which declared the poisoning in the three cases to be only "probable," after I had declared it to be "certain," for reasons which I shall now proceed to state.

Between the 4th and the 7th of May, 18—, the three children of a veterinary surgeon, E., of this city, Alma, aged three years, Hermann, aged one year, and Margaret, aged eight years, died one after the other, poisoned, as was supposed, by pieces of bread and sausage, which the rat-catcher, W., had laid about the entry of the house for the purpose of poisoning the rats. W. confessed that the poison he employed was a paste composed of butter, minced meat, *arsenic* and lamp-black. On the other hand, he deposed that neither brucine nor nux vomica were contained in his mixture. Dr. L., who was first called to the youngest girl, thought the disease, which, however, terminated in death one quarter of an hour after his first visit, to be "an inflammation of the brain." This physician did not assign any reasons for this diagnosis, but only added that no signs of poisoning were apparent to him. On the following day Margaret E. was taken ill, and her illness this physician also held to be "inflammation of the brain," and this he also supposed to be what ailed the boy Hermann, who sickened the day after, and in the case of these children also he says he saw no symptoms which could have led him to suppose that they had been poisoned. In the case of Margaret, Dr. L. observed "*stupefaction, convulsions, vomiting,* and fever." Both children died very rapidly. The remedies employed consisted of mercury rubbed up with sugar, and leeches. Dr. F. had also seen the two children, Margaret and Hermann, and in the case of the first he had observed *violent vomiting* and *diarrhœa,* fever, *stupefaction,* a collapsed and *painful abdomen,* also dilatation of the pupils; in the case of the boy *vomiting* was the most prominent symptom. Dr. F. is of opinion that the children may probably have been poisoned by the so-called sausage poison. Finally, the father of the children deponed that already on the 2nd of May he observed that his daughter Alma had a great inclination to sleep and to hang her head. During the night she became very *restless,* asked repeatedly to be placed upon the *night-stool,* and *drank* a great deal. The next morning her eyes were staring, she was *very stupid,* had no appetite, *ground her teeth* a great deal, and died that evening. On the evening of the third of May he observed that Margaret looked pale. At ten o'clock she vomited, and this was succeeded by an apparently calm sleep. Next morning, however, it was found that the child had had a diarrhœa during the night while asleep. About seven o'clock she was seized with "the *most violent convulsions,*" which lasted for a quarter of an hour, upon which the doctor was sent for. In the afternoon *vomiting* recurred several times, and the child appeared "now and then" to become unconscious; she died during the night between the 5th and the 6th. On the 4th of May the boy Hermann also did not eat as usual. He appeared to be *feverish,* his eyes were staring, *twitchings* and *vomiting* set in, and the child died on the morning of the 5th. On the 7th of May the bodies were examined by us, and the more important contents of the protocol are as follows:—

(CCVIII.). ALMA. Her tongue was faintly coated with white, her eyes were very deep sunken; her body was still quite fresh. Her stomach was externally pale as usual; it contained about an ounce (imp.) of greenish yellow mucus; at the fundus the mucous membrane had a brownish-red colour, while the rest of it was greenish. No granules, crystals, &c., were found either in the stomach or duodenum, and still less was there any appearance of inflammation or ulceration of the stomach; the whole of the intestinal canal was pale and empty. The peritoneum was not reddened; the urinary bladder was empty; the liver, spleen, and kidneys were anæmic; and even the vena cava contained but a small quantity of ordinary blood. The lungs were pale and anæmic; the heart, whose coronary vessels were almost empty, contained in its right side a considerable quantity of frothy and treacly blood, and in its left side a smaller quantity of the same. The larynx and trachea contained a little bloody froth; the large blood-vessels contained but little blood; the œsophagus was empty and quite normal. The pia mater and the brain itself were visibly congested, without being actually hyperæmic; on the other hand, the sinuses were quite filled with dark treacly blood.

(CCIX.) HERMANN. The tongue was besmeared with white, not eroded. The eyes were sunken. This body was also fresh. The stomach and duodenum were pale. The stomach contained about an ounce (imp.) of a bright greenish-yellow mucous fluid mixed with curdled milk; neither granules nor crystals, nor redness, nor anything else anormal were to be found on its mucous membrane. Liver, spleen and kidneys were anæmic; the peritoneum was not reddened; the urinary bladder was empty; the whole of the intestinal canal was pale and empty; the vena cava ascendens was filled with dark, treacly blood. On the other hand, all the thoracic organs were anæmic; the larynx and trachea were empty and healthy; the œsophageal mucous membrane displayed a faint bright-red coloration. The dura and pia mater were visibly congested; the brain was also not. anæmic, and the sinuses were remarkably full of blood.

(CCX.) Margaret. The eyes were very deep sunk. Both feet were drawn somewhat inwards, apparently from spasm; the body was not so fresh as the others, for the lower part of its abdomen was already green. The stomach and duodenum were very pale, and contained about one ounce and a-half (imp.) of a white mucous fluid. The mucous membrane of the stomach was remarkably rugose; at its lower part there was a bright-red spot about an inch in diameter, which was not distinctly circumscribed; there were neither granules nor ulcerations, &c., in either of the organs mentioned. The peritoneum was quite normal, the whole of the intestinal tract pale and empty. Liver, spleen, and kidneys were anæmic, the urinary bladder was full, the vena cava contained a moderate quantity of dark, treacly blood. The lungs contained but little blood, but the large venous trunks of the thorax contained a considerable amount. The serum in the pericardium was bloody, the heart contained a little blood in each of its four cavities. The trachea and œsophagus were quite empty and normal. The meningeal vessels were visibly injected; the sinuses were remarkably congested, and the brain itself tolerably full of blood.

In respect to the chemical investigation, the results of which are given below, I shall only quote fully that of the bread and minced meat upon which the rat-poison was spread, as they were carefully tested for nux vomica, which is very frequently employed by ratcatchers in their trade. The substances to be tested were pulverized, and then alcohol, to which a few drops of acetic acid had been added, were poured over them, and the mixture allowed to digest for several days, shaking it every now and then. After filtration, it was again digested in acidulated alcohol, and both of the tinctures were mixed and evaporated in the water-bath, to the consistence of an extract. The extract was dissolved in as much acidulated cold water as would permit of its being filtered, and an excess of calcined magnesia mixed with the filtrate. This mixture was placed for five days in a moderately warm place, and frequently stirred; it was then filtered, the dirty-white precipitate was carefully washed with cold water, and then thoroughly dried in the water-bath; it was then pulverized and repeatedly saturated with highly-rectified spirit of wine; the tinctures were evaporated first in a porcelain dish and then in a watch-glass to complete dryness.

A few drops of nitric acid being now added and the watch-glass gently heated, a distinct red colour became visible, pointing to the presence of brucine. Neither brucine, phosphorus nor arsenic (the usual rat-poisons) was found in the stomachs of any of the three bodies. Such was the case! What ought to be the decision? In our medico-legal report we stated that "as regards the symptoms of the children's illness, these seem to have especially consisted, with tolerable uniformity in each case, in affection of the brain, vomiting, diarrhœa, and convulsive twitchings. Though these symptoms are certainly observed in inflammatory affections of the brain in children, they also occur after irritant poisoning, particularly by arsenic. Whether they also occur after poisoning by the poisonous alkaloids of nux vomica (strychnine and brucine), cannot be stated with such certainty, since we have had but little experience of their effects as poisons. It has been, however, indubitably ascertained that nux vomica produces vomiting as well as twitchings and convulsions. Since, therefore, the symptoms that have occurred in these children, have been such as usually follow poisoning with arsenic or brucine, the supposition that a common poison has acted upon them is supported by the fact that all the three sickened very shortly after one another and rapidly died, which might, indeed, have been the case in regard to some few internal diseases, such as Asiatic cholera, which are completely out of the question in this case, whilst as regards inflammation of the brain, which certainly might have produced similar phenomena, it is most improbable that it would have affected three children, one after the other, since it is not infectious."

"As regards the results of the dissection of the three bodies, we have only to remark that these have been purely negative. No one organ has displayed any remarkable deviation from its normal condition, even the brownish-red and reddish fluids in the stomachs of Alma and Margaret being but the product of commencing putrefaction of the stomach. But it is expressly stated in the protocol of the autopsy, that in the stomachs of none of the three children was there found any inflammation, ulceration or the like. We cannot, therefore, deny that the dissection *itself* has not afforded any proof of the occurence of poisoning; but on the other hand, it has been scientifically ascertained that frequently after poisoning by arsenic, especially where it has been rapidly absorbed and proved fatal dynamically, the body displays no particular alterations, but only a negative appearance, as in these children. And this is also indubitably true in regard to brucine and strychnine, which, though so little known, are yet well known to be poisons, which act purely dynamically, that is, they prove fatal by acting through the nervous system, and consequently leave no visible alterations in the body. Therefore, the negative result of the dissection in the cases before us is not opposed to the supposition of the children having been poisoned."

"Finally, in regard to the chemical analysis, the following results have been obtained:

(1.) The bread and minced meat, which the children had eaten, contained neither metallic poisons (arsenic) nor phosphorus (the most common rat-poisons at present).

(2.) These substances, on the other hand, contained brucine, which justifies the assumption of their having been mixed with powdered nux vomica.

(3.) That the stomach of Alma contained no trace of any metallic poison nor phosphorus.

(4.) That the stomach of Margaret, except traces of mercury and oxide of zinc (medicines), also contained no trace of any metallic poison nor of phosphorus. And the same

(5.) Was the case with the stomach of Hermann.

(6.) That brucine was not found in any of the stomachs of the three children. Also,

(7.) According to the report of date the 28th of this month, in the substances (bread) afterwards examined, distinct traces of arsenic were found, but no brucine."

"In regard, therefore, to what we have just related as proved:

That the rat-poison set (upon bread and meat), which the three children have eaten, contains arsenic and nux vomica (brucine):

That all the three children have been seized with symptoms such as are usually observed to follow these poisons:

That these symptoms have affected the three children rapidly one after the other:

That this is never observed in any internal non-infectious complaints:

That the illness of all the three children was very speedily ended by death, which never happens in the like proportion, except in the case of diseases, for the existence of which in the cases before us there is not a shadow of proof:

That the phenomena observed in the bodies of the children are at least not opposed to the supposition of poisoning having occurred:

That no conclusion can be drawn from the non-discovery of the poison in the bodies unfavourable to the supposition of poisoning having occurred, since both of the poisons named, particularly in children, prove fatal in the very smallest doses, and such small quantities may be completely evacuated by vomiting and purging, and probably were so evacuated.

We give it as our opinion that all the three children have died from poison."

CASES CCXI., CCXII., CCXIII., AND CCXIV.—FOUR CASES OF POISONING WITH COLCHICINE.

Though transitory symptoms of poisoning from imprudent medicinal doses of preparations of colchicum are only of too frequent occurrence, yet the extreme rarity of the occurrence of fatal poisoning by such substances in medico-legal practice, and the still greater rarity of correct autopsies after such accidents, led me, after I had occasion to observe four such cases simultaneously, to lay before the medical public a comprehensive communication on the subjeet (*op. cit.* p. 60, vol. II.), and this all the more that these four cases occasioned the discovery of a method of testing for colchicine, which must be regarded as an actual and useful addition to the resources of legal medicine. In this communication I have included everything that is known about fatal poisoning with colchicine, and I will here give only a concise description of the four cases.

Four shoemakers on the 20th of February, 18—, had stolen a large bottle of *tinct. semin. colchici*, and as they took the fluid for a bitter dram, each drank about a wine-glassful of it. Schönfeld, a journeyman, died the same evening from violent diarrhœa. Müller, an apprentice, died on the evening of the 22nd, having had continuous vomiting, diarrhœa and violent colic, his senses being, however, retained. Rabisch, also an apprentice, and Them, another journeyman, also died on the 22nd, the first in the morning and the second about noon, under precisely similar symptoms. The four dissections were carried out on the 23d, and we had the advantage of having bodies which were not in the slightest degree altered by putrefaction.

(CCXI.) SCHÖNFELD, aged 30 years. The stomach is distended with a greenish fluid, with an acid reaction; its mucous membrane displays a uniform scarlatinous redness, in which, however, individual vessels are not to be seen. The small intestines are filled with a similar fluid, and display many rose-red patches externally. There is nothing particular to be seen on their mucous membrane, and just as little in the liver, spleen, pancreas, omenta, mesenteries, and urinary bladder; the urine is acid; the gall-bladder empty. The kidneys are unusually full of blood; the vena cava quite filled with very thick treacly, and dark cherry-coloured blood. The right side of the heart is distended with similar blood; the left side contains but little blood, as is also the case with the lungs and the thoracic vessels. The œsophagus is healthy, and it, as well as the trachea, empty. The meningeal vessels are distended, and the sinuses also contain much blood. The substance of the cerebrum is everywhere quite unusually full of blood.

(CCXII.) Müller, aged 15 years. The eyes are sunk very deep. The blood-vessels on the small curvature of the stomach are distended; the stomach is entirely filled with a bright blood-coloured acid fluid; its mucous surface is pale, the posterior wall, however, almost completely covered with small purplish-red patches. The liver is tolerably anæmic; the gall-bladder of this body is tensely filled. Spleen, pancreas, omenta, and mesenteries display nothing unusual. The kidneys are hyperæmic, the intestines normal and empty, the urinary bladder distended with acid urine, the vena cava is quite full of blood similar to that in the former body. The lungs are normal. The coronary vessels of the heart are tolerably distended, its right half is quite remarkably so; its left half is tolerably well filled, as are also the large thoracic vessels. The trachea and œsophagus are normal and empty. The hyperæmia of the cranial cavity is precisely the same as in the foregoing case.

(CCXIII.) Rabisch, aged 16 years. The eyes are sunk very deep. The stomach is filled with a yellowish acid fluid, and is, externally as well as internally, normal; at the cardiac opening, however, the mucous membrane may be easily stripped off with the finger. The gall-bladder is filled; liver, spleen, pancreas, omenta, and mesenteries are noways remarkable, both kidneys are, however, hyperæmic. The urinary bladder is distended with acid urine. The intestinal tract is empty and normal!; the vena cava ascendens is stuffed like a sausage with very thick, treacly, dark-brownish cherry-coloured blood. The lungs are only moderately full of blood; the pericardium contains no serum; there is veritable turgescence of the right side of the heart, while its left is only moderately full; the large vessels are also very much distended. The œsophagus is perfectly normal and empty, as are also the larynx and trachea. The meningeal vessels are distended with blood; the sinuses and cerebrum are also unusually full of blood.

(CCXIV.) THEM.—In this body also the eyes are very deeply sunk. The stomach, which displays nothing remarkable either externally or internally, is perfectly filled with an acid fluid, which looks like curdled milk. Its vessels are strongly congested. The intestines are pale and empty, the gall-bladder filled; the liver, spleen, pancreas, omenta, mesenteries, kidneys, which latter are very hyperæmic, and the urinary bladder, which is half-full of acid urine, are all normal. The vena cava ascendens is in this case also, precisely as in the previous one, stuffed like a sausage with very treacly, dark cherry-red blood. The lungs (of this man, aged about 40 years) are œdematous, the pericardial cavity is almost dry, the coronary vessels of the heart contain but little blood, its left half contains a tolerable quantity, and the right is quite distended with blood like that we have just described. Œsophagus, larynx and trachea are empty and normal; in the cranium there is the same hyperæmia described in the previous cases.

I have already (p. 60, vol. II.) pointed out those appearances found on dissection which were common to all the four, and those in which they deviated from each other. In regard to *the chemical discovery of colchicine,* I may state that the contents of the stomachs of the bodies were well shaken up along with a large quantity of alcohol, acidulated with a few drops of hydrochloric acid, then filtered, and the filtrate concentrated, at a temperature of + 30 R. = 99·5 F., to the consistence of a thin syrup; this residuum was next dissolved in distilled water, whereby much fatty matter was got rid of, then filtered, carefully evaporated, and alcohol added to the residuum so long as any substance continued to be dissolved; it was again filtered, and the filtrate evaporated at the temperature already mentioned to the consistence of thin syrup.

This residuum was again dissolved in distilled water, filtered, and evaporated to two ounces, and about one drachm (imp.) of *magnesia usta* added to it, in order to set free any colchicine that might be present, it was left in contact a sufficient length of time, and then three fluid ounces of æther were added to the mixture. After the æther had been a sufficient time in contact, it was removed by a pipette and allowed to evaporate spontaneously. The residuum was dissolved in water, a fatty substance easily soluble in alcohol being thus got rid of, and the watery solution, after being again filtered, was evaporated in a watch-glass. The residuum now obtained was dissolved in a small quantity of water; tested with tannic acid it gave a voluminous white precipitate, easily soluble in alchohol; with a solution of chloride of platinum, it gave, after a short time, a yellow precipitate, and with tincture of iodine it gave a reddish-brown (Kermes coloured) precipitate. All of these reactions pointed it out as colchicine, as did also its acrid taste.

CASE CCXV. POISONING BY CAUSTIC SODA.

A., an unmarried woman, was accused of having made an attempt to murder her child, aged three years, by poison. The witness, S., had seen the child "constantly vomiting, and gurgling in its throat as if it would choke. On opening the mouth of the child, he was astonished to see the skin separated from the lips and tongue, these parts appearing quite red, like raw flesh and full of blisters. The child could not speak a single word." Next morning, Dr. H. found "the mucous membrane of the lips and sides of the mouth reddened." The accused stated that the child had hurt itself by licking the cork of the bottle. We had to test the truth of this statement, and to ascertain the contents of the bottle, and the nature of the stains on the child's clothes. The contents of the bottle were yellowish-brown, extremely alkaline in reaction, destroyed the skin of the finger, and smelt like lye. Tested with chloride of platinum and tartaric acid it evinced the presence of potash, whilst the blowpipe and combustion of alcohol proved the presence of soda. It also contained traces of carbonic acid, hydrochloric acid, sulphuric acid, lime, clay, and silica. It was, therefore, the so-called washing or soapboiler's lye, a concentrated solution of caustic with some carbonate of soda, rendered impure by the presence of neutral salts and earths. The stains on the child's clothes were covered with a white powder. On being cut out, soaked in distilled water, and the solution tested with test paper, acids, chloride of platinum, &c., carbonate of soda was recognised as present, which made it highly probable that the stains had arisen from the washing lye, whose caustic soda had attracted to itself the carbonic acid of the atmosphere, and thereby become a carbonate.

It was also stated in regard to the judicial query, that a bare licking of the cork could not be supposed to have been the cause of the symptoms, since these proved that the caustic fluid had reached the stomach, or at least the fauces of the child.

Another case of accidental suicide by a lye of caustic soda gave rise to a medico-legal autopsy. A man, aged 63 years, had on a Monday evening accidentally drank from six to eight ounces! of this instead of beer, and was immediately seized with a violent burning in the fauces. A quantity of olive oil was instantly given him, and afterwards milk; he vomited freely. The physician who was immediately called applied leeches on the neck. During the following days bloody stools occurred (no more vomiting), with pain in the region of the stomach, after three days pneumonic symptoms set in, and he died on Saturday morning with symptoms of delirium, picking of the bedclothes, &c. The body was obliged to be kept in a warm room (during December, at a temperature of + 4° R. = 41° F.), and on the third day we found putrefaction already far advanced, particularly on the belly and genitals. The blood in the body had no alkaline reaction, but a perfectly peculiar brownish-red colour almost like Malaga wine. And not only was the body (all except the lungs) remarkable for its anæmic condition (explicable by its putrefied state), but what blood was in it seemed to be almost wholly coagulated in fibrinous clots. The very insufficient place in which the autopsy was made, did not permit of an immediate microscopic examination of the blood, but this was made the next morning, and the *blood-corpuscles* were then found to be *completely collapsed*, their pigment being still retained. Chemically investigated the blood was found to be neutral, its somewhat alkaline reaction being obviously due to the process of putrefaction. The trachea, beneath its bronchial division, was already of a chocolate-brown from putrefactive imbibition, but in its upper portion and in the larynx there were very evident signs of inflammation, but no contents. Both lungs were hyperæmic and excessively œdematous, the right displayed a considerable amount of recent hepatisation, particularly in its upper lobes. The flabby heart contained a few of the brownish-red clots described. The œsophagus and fauces as well as the tongue and lips displayed nothing anormal. The stomach was apparently as firm as usual, not softened, still less perforated, but rather displayed externally only the usual hues of putrefaction. Its mucous membrane was, however, completely softened, its fundus already beset with putrefactive bullæ, but amidst the hues of putrescence we could still distinctly recognise the dendritic injection and scarlatinous redness of inflammation. No erosion could be discovered. The inflammation did not extend into the duodenum, still less into the lower parts of the intestines. The anæmic liver and kidneys displayed a dirty greyish-red appearance, which was probably due to the peculiar colour of the blood.

Case CCXVI. Poisoning by Alcohol.

On the 31st of October, a man, aged 40 years, and very drunk, fell down dead on the spot. Four days afterwards, we examined the body. The continued existence of the rigor mortis, the perfect freshness of the body (*vid.* p. 64, Vol. II.), a very strongly marked *cutis anserina* over the whole body, and the fact of the tongue being incarcerated between the teeth were all very striking peculiarities. The dura mater was strongly injected, and the usual whitish gelatinous exudation, which is found spread over the brains of all who have been for any length of time habitual drunkards, was also present. The vessels of the pia mater were strongly, but not immoderately filled. Upon the right hemisphere there was an extravasation of fluid blood of about two drachms (imp.) in weight. The cerebrum and the cerebellum, the choroid plexuses, and the sinuses presented nothing remarkable. The smell, however, of alcohol exhaled both from the cranial and thoracic cavities was most remarkable and unmistakeable. The lungs contained the normal amount of blood, the large blood-vessels contained a tolerable quantity of dark fluid blood, but the heart was quite empty. I omit the appearance of the abdominal organs, as they presented nothing unusual, only remarking that the vena cava was turgid with very dark fluid bood.

Case CCXVII. Poisoning by Alcohol.

A case precisely similar to the previous one. This man, aged about 40 years, was also very drunk when he fell dead upon the street. We saw the body for the first time seven days after death, in December, but although the temperature had been continuously above 0° R. = 32° F., it was still quite fresh and scarcely displayed the first traces of putrescence. In this case also the smell of brandy exhaled from the cranial and thoracic cavities was, though fainter than in the last case, still unmistakeable. Hyperæmia of the brain (without hæmorrhage) had been the cause of death. The heart was not so bloodless as in the former case, but the blood was dark and fluid as in it. There was nothing else remarkable observed.

Case CCXVIII. Poisoning by Alcohol.

The body of a man, aged 22 years, who had fallen dead when very drunk, was dissected *nine* days after death, which took place in April, with an average temperature of + 6° R. = 45°·5 F. And in this case also the persistent freshness of the body (which only displayed the commencement of the greenish coloration of the abdominal coverings) and the long continuance of the rigor mortis, which was still present in all the extremities, were very remarkable.

The evident remains of the thymus gland at so advanced an age was also an extremely interesting appearance. Congestion of the meningeal vessels and of the sinuses; the blood dark and fluid; an unusual congestion of the lungs with a bloodless condition of the heart and pulmonary artery. The liver tolerably full of blood. The stomach half filled and exhaling a powerful alcoholic aroma. The urinary bladder distended and extending for two fingers' breadth above the symphisis pubis; the vena cava turgid with blood.

Case CCXIX. Poisoning by Alcohol.

This man, aged 42 years, was brought home very drunk, put to bed and shortly thereafter died. The average temperature, in September, was + 10° R. = 54·5° F., and the body was upon the third day after death perfectly fresh. The most important results of the dissection were, anæmia of the cranial cavity, distinct smell of alcohol in the thorax, a quite unusual amount of œdema of the lungs, so that a bright blood-coloured frothy water actually streamed from them when incised; the right side of the heart, particularly the auricle, was so perfectly stuffed full of dark coagulated blood, that it had attained the size of a small apple; the left side of the heart was very much less distended, its auricle quite empty; the pulmonary artery was also turgid with dark coagulated blood. The stomach was pefectly full of water, every thing else was normal.

CASE CCXX. POISONING WITH ALCOHOL.

This was the case of a very powerful labourer, aged 26, who came home at night very drunk, and was found dead in bed next morning. The body remained under my observation long after death. It was January, but the atmospheric temperature was almost continuously at + 2° to 5° R. = 36° to 43° F., with mild west or south winds. Nevertheless, the body remained *perfectly fresh* up to the ninth day, and only on the tenth day the abdomen began to assume a green hue. The dissection took place on the eleventh day. The whole head was of a red colour from post-mortem staining; the tongue lay fixed between the teeth. There was little or no odour of putrefaction, but also no smell of alcohol. There was hyperæmia of the dura and pia mater, but not of the sinuses. No intracranial extravasation. In the lungs there was much cadaveric œdema. The right side of the heart was filled almost to bursting with quite dark, very fluid blood, whose corpuscles seemed quite unchanged when examined through the microscope; the left side of the heart was almost empty, but the large vessels quite distended. The stomach contained a quantity of pultaceous alimentary matters. There was nothing else remarkable found, except that the urinary bladder, as in cases of compression of the brain from other causes, *e.g.*, from cranial injuries, was quite distended and reached above the pubis.

CASE CCXXI. HAS THERE BEEN POISONING WITH ANY NARCOTIC?

Besides the seven cases of poisoning suspected, but not confirmed, by the examination of the body detailed in the first and second hundred of my "Gerichtliche Leichenöffnungen," three of which are given further on, numerous similar cases are continuously brought before us. Death occurring suddenly, under circumstances which are unusual or alarming to the non-medical onlookers, has been from some cause or other assumed to be the result of poison. But this sudden death has been found to have resulted from incarcerated hernia, internal strangulation of the intestines, apoplexy, Rokitansky's (perforating) ulcer of the stomach (twice over), Asiatic cholera (in three of a family said to have been poisoned by some plum-soup containing copper), &c. Such cases, however instructive in themselves, have no peculiar medico-legal interest, and we shall not increase the already numerous collection of cases in this work by describing them. On the other hand, the following one indubitably deserves narration for reasons which shall presently appear. It is a veritable medico-legal romance.

The father of a man, aged 44 years, had left 15,000 dollars (£2,250), and a will disposing of it in favour of any future progeny by his son, who was profligate, a great drunkard, and still unmarried at the time of the father's death. On the 20th of April, 18—, this son was seized with what was stated to be "tetanus," and his mistress, a girl, aged 19, and her mother, with whom they lived, obtained a medical certificate that he was dying; whereupon he was the same day married to the girl, the laws of the church, in relation to the dying, permitting this. Next day, the 21st, the newly-made bridegroom was admitted into the Charité-Hospital labouring under "delirium potatorum." Here he received, according to the daily sick reports which were laid before me, from the day of his entrance to that of his death, the 23rd, *zincum aceticum* and *one grain and three-quarters*, in all, of acetate of morphia. Immediately after his death, his sister came forward, accusing the young widow of having given the deceased some "narcotic," in consequence of which her brother was seized with the tetanic convulsions, and became incapacitated for disposing of his property, wherefore she prayed that the marriage should be set aside. The widow, on her part, immediately declared herself to be pregnant! Such was the complicated judicial situation of the matter, on the one hand, supposed poisoning, on the other, the various civil processes which might be foreseen regarding the legitimacy and power of succession of the possible heir of the deceased, when we performed the medico-legal autopsy; at which, amongst others, the following certainly hitherto unheard of query, though one very natural under the circumstances, was placed before us:—Is it possible to determine from the body, whether the deceased was *capable of procreation* on the 20th of this month?! The autopsy, which was carried out on the 28th, was itself in so far without interest, that it was entirely negative, affording in particular no evidence which could raise even the slightest suspicion of poisoning. We therefore declared in the protocol, that the deceased had died from an internal complaint, and that any further information respecting the suspected poisoning could only be obtained by a chemical analysis of the intestinal contents. This analysis had the difficult task of answering the question laid before us by the Judge, "has the deceased previous to his reception into the Charité on the 21st, received any narcotic which has put him in a state of testamentary incapacity?" and I may remark, that the administration of one narcotic, viz., morphia, *after* the 21st continuously up to the period of his death, was ascertained, and it might have been expected to have been found in the body. *No traces of it were discovered!* The analysis was made in the following manner:—The stomach and intestines were emptied into a new porcelain dish, carefully cut in pieces, the pieces well mixed together, and the whole divided into three portions. I. Two-thirds we put into a cylindrical glass, and poured over them strong spirit acidulated with a little acetic acid, the glass was covered with pig's-bladder, and the matters in it allowed to digest for several days at a temperature of 60° to 70° C. = 140° to 158° F. It was then allowed to cool, filtered, and the residuum treated twice over with acidulated alcohol in the same manner. These tinctures were evaporated at a gentle heat to the consistence of syrup, and the residuum dissolved in as much cold distilled water as would permit of its being filtered. The filtrate was made neutral by the careful addition of caustic ammonia, and a recently prepared infusion of galls added to it, so long as any precipitate could be obtained. After this had completely settled, the supernatant fluid was carefully poured off, and to it was added a solution of chloride of barium, so long as any precipitate was produced, and the mixture then set aside. The precipitate obtained by the infusion of galls was thoroughly washed in a filter, and, while still moist, mixed with a slight excess of recently slaked lime, and to this enough of distilled water was added to make it the consistence of gruel. After being well mixed in a mortar, the mixture was evaporated to dryness in a water-bath, the residuum reduced to powder, and boiled three times with strong alcohol. The colourless decoctions were filtered and evaporated to two fluid drachms with the aid of very gentle heat. On cooling, no crystals had formed; it was therefore evaporated to complete dryness with the aid of very gentle heat, the trifling white residuum dissolved in a few drops of water acidulated with acetic acid, and an excess of caustic ammonia added to it. After the lapse of twenty-fours hours, when the ammonia had wholly evaporated, there was still *no trace* of any crystalline deposit that could lead to the supposition of the presence of any vegetable alkaloid.

The deposit obtained by the chloride of barium, which had a yellowish-brown colour, was thoroughly washed upon a filter, and then placed while still moist in a small digesting jar, diluted sulphuric acid was poured over it, and it was allowed to stand for several days. It was then filtered, and the clear yellow fluid mixed with a dilute solution of the chloride of iron, of such strength as that the colours of both solutions were alike. During the mixture of the fluids, *no red colour* was formed (opium).

II. The remaining third part of the organs was placed in a tubular retort, a diluted solution of caustic soda added to it, and after the receiver had been surrounded with a mixture of pounded ice and common salt, about one ounce and a-half were distilled over with the aid of a gentle heat. The ammoniacal colourless distillate was neutralised with diluted sulphuric acid, and evaporated by a very gentle heat to about one drachm. This residuum was put into a small digesting jar, and five times its volume of a mixture of alcohol and æther poured over it, thoroughly shaken, and then set aside.

The ætherial fluid was carefully removed, placed in a flat porcelain dish, and allowed to evaporate spontaneously. The small quantity of almost colourless residuum was treated with a dilute solution of caustic soda, a faint cadaverous odour was exhaled, but no smell having even the most faint resemblance to that of *hemlock*. That portion of the residuum which had not dissolved in the mixture of æther and spirits of wine, was mixed with a little of the solution of caustic soda, and treated as above with pure æther. The æther was then removed, and allowed to evaporate spontaneously in a watch-glass till all ammoniacal odour had quite disappeared. The scanty, yellowish, oily residuum had a cadaverous odour, not in the least resembling that of *nicotine*. The results of this investigation, therefore, showed that in the internal organs of this body there was neither meconic acid (therefore no opium), nor morphia, nor atropine, nor conia, nor nicotine found. Therefore the question, has any "*narcotic*" been administered to the deceased? must be answered in the negative, in so far as the chemical analysis can answer it. Nevertheless—but in this case this fact was of no judicial importance—it was perfectly certain that the deceased had received, shortly before his death, a considerable quantity of morphia, which he had so digested that the most careful chemical analysis could discover no trace of it. AFFORDING THEREBY A FRESH TESTIMONY TO THE FACT THAT IN CASES OF DOUBTFUL POI-

SONING THE PROOF OF IT MUST NOT BE EXCLUSIVELY INTRUSTED TO THE CHEMISTS! As to the extraordinary question regarding the power of procreation, we answered it thus, that the dissection had not revealed anything which would have rendered procreation by the deceased impossible on the 20th (three days before death—no malformation of the genitals, &c.), that however any more certain opinion could only be given after ascertaining the state of the deceased's health, upon the whole of the day in question. The case was not proceeded with, as no crime had been discovered, and the young widow was acknowledged as heiress. (I do not know whether she was afterwards confined.)*

CASE CCXXII.—SUPPOSED POISONING BY LIVER SAUSAGE.

A young journeyman tradesman was taken ill immediately after eating liver sausage. The symptoms, so far as they are known to us, were vomiting, no purging, pain in the *lower part* of the belly, rapid collapse, and a feeble or soft pulse. Death occurred in from 10 to 12 hours, so that the physician, at his second visit, found his patient already dead. The supposition that he had been killed by a poisonous sausage caused the body to be medico-legally examined, and this took place four days after death, in November (at a temperature of $+ 2° \text{ to } 4° \text{ R.} = 36°.5 \text{ to } 41° \text{ F.}$). The rapid advance of putrefaction, in spite of this cool autumnal temperature, was quite remarkable (from this cause *alone* the hair came out at the slightest touch!) so that almost the whole body was already green, and the genitals were inflated. But the dissection at once removed every suspicion of poisoning, for there was found a scirrhous consolidation of the coats of the stomach in the anterior wall, one inch beneath the small curvature, the size of half-a-crown, and in its centre there was a perforating ulcer three lines in diameter, with hard, pale, and rounded edges, through which six ounces of the fluid contents of the stomach had escaped into the cavity of the abdomen. The result of this was, that the peritoneum, particularly on its anterior part, was acutely inflamed, and a large loop of the great intestine adherent to it by purulent exudation; there was also more than a teaspoonful of yellow pus in the sac of an inguinal hernia on the right side. We could, therefore, declare that death in this case had certainly occurred from the internal disease named, and not from poison, so that no chemical analysis was required (which would, moreover, have been quite fruitless in the event of death having been caused by sausage poison).

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* *Vide* two cases of poisoning by copper and zinc, and by chloroform § 74, Cases CCCXXV. and CCCXXVIII.

Case CCXXIII.—Supposed Poisoning.

In this case also, which was precisely similar to the foregoing one, a disease which attained a fatal termination under remarkable symptoms, was, for reasons unknown to us, held to be the result of poisoning, and therefore a medico-legal examination of the body was ordered, which at once evinced the baseless nature of the suspicions. A boy, aged ten years, was stated to have been seized with vomiting, shortly after partaking of some gruel, and speedily thereafter died. The chief results of the dissection were: 22 ounces of bloody fluid in the abdominal cavity, general peritonitis and enteritis, both the small and large intestines covered with a semi-purulent exudation, and all matted together; and the cause of all this violent inflammation was nothing else than the strangulation of a piece of intestine, six inches long (which was found to be quite gangrenous), in the omentum. It was also pathologically interesting to find that even the upper surface of the liver was closely adherent to the diaphragm. The stomach and duodenum had not shared in the inflammatory action. The brain was much congested, but the heart and lungs were quite normal. The chemical analysis of the contents of such intestines were of course superfluous; yet, as a suspicion of poisoning had been raised, it was required, and dared not be omitted; no trace of any poison was found. It is but seldom that medical jurisprudence comes off so triumphantly as in such cases as these. Every suspicion of so horrible a crime raised against a perfectly innocent individual, is at once removed, solely but unanswerably, by the clearing up of the facts of the case by judicial medicine, not only in these two cases just related, but also in every other similar one!

Case CCXXIV.—Supposed Poisoning by Belladonna.

It was impossible in this case to give an equally decisive opinion. A man, aged 50 years, had taken tea made of Belladonna leaves *six months* before his death; he fell into ill-health, and died, after four months' treatment in the Charité-Hospital. Such was the very superficial history of the case, given us at the time of the autopsy. We were left in total ignorance as to how many Belladonna leaves the man had made use of, or what form his lingering illness had assumed. The body was extremely emaciated; its feet œdematous, a very large bedsore likewise existed, also general anæmia; and the only thing remarkable, or anormal, found internally, was a very small and contracted stomach. Such being the result of the autopsy, we did not feel justified in giving any other summary (provisional) opinion than, that the deceased had died of a chronic internal disease, that the connection of this with the poisoning could only be said to be possible, and that any chemical analysis of the contents of the body would, from the nature of the poison and the lapse of time, be of no use. The result of this opinion was, that the documentary evidence was reponed and no report was required.

CASE CCXXV.—SUSPECTED POISONING BY WATER-HEMLOCK.

A boy, aged five years, died in the end of April, after a short illness, regarding which I have learned nothing, supposed to have been poisoned by water-hemlock. The autopsy was made on the 1st of May, three days after death, and the first thing that then struck us was the fact that, with a temperature varying from + 10° to 12° R. = 54°·5 to 59° F., the body was still quite fresh, and the abdomen only beginning to become green. The joints were flexible. The stomach was pale, and contained a little thin reddish pap and a few flakes of curdled milk; there was nothing else in particular, and specially no vegetable remains. The small intestines were visibly reddened by vascular injection, the large intestines contained fæces. The liver and the kidneys were tolerably full of blood, and this was everywhere throughout the body, even in the large venous trunks, very dark and fluid. There were no ecchymoses in the stomach or intestinal tract. The lungs were healthy and very full of blood. The right side of the heart contained a little dark fluid blood, the left was empty. In each pleural cavity there was about a tablespoonful of serum. The thymus gland was still very large. The tracheal mucous membrane was of a reddish colour. The meningeal vessels were strongly injected, the sinuses distended, the brain contained also more blood than usual. The chemical examination of the stomach and its contents proved the absence of every injurious mineral substance; and, in regard to the suspected poisoning by water-hemlock, we stated in our report, "That in the absence of antecedent information, this suspicion could not be verified, nor even made probable, since no recognisable vegetable remains were found in the stomach, and chemistry possesses no means of detecting water-hemlock in the animal body after the poison has once been digested."

CHAPTER IV.

DEATH FROM SUFFOCATION.

§ 39. GENERAL.

DEATH from suffocation arises from a negative poisoning of the blood, inasmuch as when suddenly deprived of the influence of the oxygen contained in the atmospheric air, by any of the manifold modes of producing this condition, it ceases to be able to vivify the nervous system, and render it fit for the discharge of its functions. Either the whole of the nervous system is thus suddenly paralysed, and death ensues from neuroparalysis (nervous apoplexy), which leaves no trace discoverable by the anatomist's knife; or that part of the nervous system supplying the lungs and heart alone is affected, thereby producing vascular congestions, which are found in the body after death. In a contracted sense, however, and as ordinarily used by non-professional people (as the Judge, &c.), "suffocation" does not signify every kind of fatal congestion of the circulation, but only that produced by foreign bodies obstructing the air-passages, or by the breathing of irrespirable gases. Every possible form of suffocation is produced either mechanically or dynamically. Mechanically, by disturbing or destroying the pulmonary mechanism, so that the lungs can no longer perform their functions; death is produced in this manner by every important injury of the thorax, such as the being driven over by a carriage, the falling of heavy weights upon the chest, the being crushed in a crowd, the squeezing of new-born children into chests, covering them up too close in bed, or the like; further, the closure of the nose and mouth of new-born children by the thigh or some other part of the mother's body, or of nurslings when asleep at night by the breast or some other part of the body of those nursing them; finally, death by being buried alive by the falling of buildings, walls, or the falling-in of pit-shafts, is usually produced by asphyxia, and generally by precisely this form of it. The diagnosis of this form of death is usually easy, since, besides the general cadaveric phenomena due to asphyxia, traces of injury from the falling bodies are usually to be found on the parts of the body affected. Or death from suffocation may occur mechanically, by compression and obstruction of the air-passages, by choking, strangling, or hanging, or by occlusion of them by any kind of foreign[*] body. The diagnosis of this form of death will be explained in the following chapter. The foreign body is found either wholly or partially still sticking in the air-passages of the corpse, or traces of reaction as scratches, wounds, ecchymoses, or other similar phenomena are found on the organ injured, thereby affording proof that some foreign body has produced death by suffocation, the general evidence of which will be found on an internal inspection of the body.

Asphyxia is brought about in a more dynamical manner, when without any mechanical obstruction of the air-passages the blood is poisoned by being deprived of the influence of oxygen, and the nervous system paralysed by the sudden and violent arrest of the interchange of material at its source. This happens when the air-passages get filled by media unsuited for the maintenance of respiration, such as water, any watery fluid or irrespirable gases. All these modes of producing asphyxia, however, in their mode of operation and the more important post-mortem appearances resemble one another.[†]

§ 40. Diagnosis.

The post-mortem appearances found in those asphyxiated vary according as death has taken place from neuroparalysis or from hyperæmia of the thoracic organs; further, according to whether it has occurred during expiration or inspiration, the lungs being, of course, always more congested in the latter case, or according to individual peculiarities, happening in the one case in a subject full of blood, and in another in a more anæmic one; or, finally and specially, according as death has occurred suddenly or more slowly and gradually. In most cases a man dies suddenly who has been suffocated by being hanged, choked or strangled, and also in many cases of drowning, while death occurs more slowly when produced by most of the irrespirable gases, particularly by the most common of all, carbonic oxide gas, by being buried alive, not unfrequently in cases of drowning, and in every case in which the lungs continue to be for some time supplied with atmospheric air more or less deficient in quantity or purity. Nevertheless, exclusive of variations in the individual phenomena, exclusive, also, of those cases of death from neuroparalysis, which leaves few or no traces in the body, the post-mortem appearances of death from suffocation are taken as a whole so characteristic that it is by no means difficult to determine them (at least in a tolerably fresh body). They are as follow:—

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[*] *Foreign* bodies, I say, since the continually requoted "turning back of one's own tongue," as a cause of suicidal suffocation, has certainly never been seen.

[†] For this reason alone, and to prevent repetition in detailing the results of the dissections, we have included the irrespirable gases, and the blood-poisoning which they produce, under the head of "Suffocation," though, in ict science, they belong to that of "Poisoning," as we have, indeed, every-
re pointed out (*Vid.* p. 44, vol. II.).

(1.) I have already (§ 12, p. 29, Vol. I) pointed out how erroneous is the opinion very generally held that *cadaveric rigidity* either does not occur at all, or is of very short duration in the bodies of those suffocated. Cadaveric rigidity occurs under the same conditions, and has the same relative duration in the bodies of those suffocated as in those who have died from any other cause (*Vide* Illustrative Cases).

(2.) There is a relative long continuance of warmth in the internal organs (§ 7, p. 18, Vol. I).

(3.) There is a universal and unusual *fluidity of the blood,* and this is found in cases of every kind of suffocation without exception, but it is no doubt also found after death from other causes, such as putrid fevers, narcotic poisons, &c. Appearances found upon dissection, which depend upon this peculiar fluidity of the blood, have been erroneously interpreted by overlooking this condition, particularly those unusually numerous bloody points found upon the cut surfaces of the brain, which are by no means always significant of excessive cerebral hyperæmia; and the same is true of the escape of blood from the cranial bones when sawn across, which Pyl erroneously pointed out as a specific sign of death from drowning; this, however, as well as the other phenomenon just mentioned, is found in every body in which the blood remains fluid (of a watery consistence). Moreover, I may remark that in spite of the universal watery condition of the blood, very considerable coagula are often found in the heart even in the most exquisite cases of suffocation, but these can never mislead, inasmuch as their presence does not exclude the idea of death from this cause.

(4.) *The dark colour of the blood.*—It is found carbonised in every case of asphyxia. In isolated cases of suffocation in carbonic acid gas, the colour of the blood is often, however, more of a cherry-red than an actually dark colour (Case CCXLIX). We must, however, point out that a correct eye for colour, and particularly for the nice discrimination of shades of colour, is something far too individual for any particular value to be placed upon this as a means of diagnosis (*Vide* § 88). A more correct knowledge of the various degrees of the oxidation of hæmatine (melanine, &c.), may probably afford more certain information upon this point.

(5.) *Hyperæmia of the lungs* (pulmonary apoplexy) is one of those appearances which is rarely absent, though it may be so. Usually, both lungs, rarely one more than the other, are more or less gorged with blood of the nature described; the ordinary hypostases found in the depending portions of the lungs of all bodies ought not to mislead in this matter (*Vide* § 9, p. 22, Vol. I.).

(6.) *Hyperæmia of the right side of the heart,* whilst the left is either entirely empty, which is rare, or contains but a few drachms of blood. In order to observe correctly the amount of blood contained in the heart, it is necessary to examine the heart first of all, and this is best done according to the method of procedure described in § 48 (p. 210, Vol. I.), the lungs are next to be examined, and, last of all—

(7.) *The pulmonary artery,* which is also, for well-known anatomical reasons, found congested in those asphyxiated.

(8.) In a former work* I have pointed out an extremely interesting appearance found on dissection, which I have observed in very many cases of new-born children suffocated (*Vide* amongst others, Cases CCXXXIII—CCXXXV., CCXXXIX., CCXL., CCXLII.), but only twice in adults (Cases CCLXX., CCLXXXV.), and twice also in the bodies of boys, one of ten and one of six years old, suffocated in smoke (Case CCLIX., CCLX.), which has also been frequently observed by others (Röderer, Michaelis, Bayard, Elsaesser, Weber, Hecker, Hoogeweg, Tardieu, Maschka, Schwartz, &c.), and which will certainly be more often observed in the future by medical jurists, if they will look for it, I mean the small *capillary ecchymoses,* resembling petechiæ, found beneath the pulmonary pleura, upon the aorta, on the surface of the heart, even upon the diaphragm, which give the parts a spotted appearance, as if they had been sprinkled with some purplish-red fluid.

The delineation given (Plate VI., Fig. 15) represents this appearance true to nature. The child from which this was taken was indubitably still-born, like many others of the cases which have come under my own observation, partly in the course of my forensic practice, and partly fœtuses born in the Maternity Hospital. Indeed, I have twice seen these capillary ecchymoses in unborn fœtuses, the one case was the unborn child of a woman who hanged herself in the eighth month of her pregnancy, and the other was that of a woman who died apoplectic, after fourteen hours' illness, in the seventh month of her pregnancy. The fœtus, in the first case, had upon the lower lobe of its perfectly fœtal lung a considerable number of these ecchymoses, very distinct and each about the size of a lentil; in the other case, both of the fœtal lungs had isolated but very distinct subpleural ecchymoses, some of them as large as a pea. Along with these we may reckon an observation of Maschka,* who found numerous ecchymoses, each the size of a pin-head, on the surface of both lungs of a female fœtus born putrid. Twelve also of the cases observed by Schwartz,† most of those described by Elsaesser, and all the similiar cases observed by Hecker and Hoogeweg,‡ were cases of still-born children. This certainly shows that the greatest care must be exercised in determining doubtful cases of death by suffocation in new-born children. In an actual case of suffocation, however, that is, when a child has really breathed and been afterwards killed by suffocation, a careful examination of the body will always afford data sufficient to prevent its being confounded with a case of suffocation *in utero*. What medical jurist would, then, base his diagnosis and his opinion merely on the occurrence of these petechiæ-like ecchymoses? Moreover, their origin can only be ascribed to the phenomena precursory to every kind of suffocation. One source of this is to be found in impeded placental circulation, as has been indubitably proved both by observation and experiment. Accordingly, the origin of these ecchymoses is to be traced to the thinness of the walls of the capillaries in new-born children and infants (a condition which may also be found, exceptionally, in adults).§ Breathing has been fitly termed an exchange of gases; this is brought about by the placenta in the case of the unborn child, and in this sense the child may be said to breathe *in utero*. Should this exchange become interrupted by premature separation of the placenta, or by pressure on the umbilical cord, which, as Hohl * says, may from this point of view be regarded "as in some sort the trachea of the fœtus," as the ancients called the placenta its "lungs," or, finally, by the death of the mother during pregnancy or labour, then the child makes instinctive respiratory movements in order to maintain this exchange of gases, and so these congestions and ecchymoses described are found to occur even within the uterus. Hecker's fourteenth case, and Hoogeweg's case, in which the children were certainly known to have been dead previous to birth, had consequently been suffocated while making instinctive respiratory movements *in utero*. Schwartz (*op. cit.* s. 83) has repeated the experiment of Winslow and Béclard, laying open the uterus in pregnant rabbits, and noting the phenomena observed. On the bare compression of the uterine arteries, by the contractions of the muscular coat, there followed an opening and shutting of the mouths of the fœtuses, accompanied, or immediately followed by a sudden convulsive respiratory elevation of the ribs, which was repeated after irregular intervals, gradually becoming less frequent, and feebler. Subsequent to these instinctive respiratory movements observed in these experiments, there were found "the actual signs of death from asphyxia by drowning: the heart, particularly the auricles, stuffed with dark fluid blood; the branches of the pulmonary arteries and veins always contained blood, while the air-passages were filled with a watery fluid, probably *liquor amnii*," and just so we find in children stillborn or dying immediately after birth, "almost without exception, the air-passages filled with inspired fluid, the result of these premature respiratory movements.† We shall return to this subject when we come to speak of *vagitus uterinus* (§ 83).

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* Gerichtliche Leichenöffnungen. Erstes Hundert. 3 Aufl. s. 84.

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* Prager, Vierteljahrschrift, 1858, ii. s. 99.

† Die vorzeitigen Athembewegungen. Leipzig, 1858.

‡ Verhandlungen der geburth. Gesellschaft. Berlin, 1853, 7; Heft und Casper's Vierteljschft. 1855, i. s. 40.

§ In such cases, a violent concussion may suffice to rupture the capillaries and form these sub-pleural ecchymoses, as the cases observed by Maschka prove. *Vide* Prager Vierteljarsschrift, 1857, iv. s. 62.

(9.) A most characteristic sign of death from suffocation from any cause, is to be found in the condition of the cavity of the larynx and trachea, though it has most unaccountably been either omitted altogether from most of the text-books, or been only mentioned in connection with asphyxia from drowning. After *every kind* of violent suffocation, except that proving fatal by neuro-paralysis, which happens instantaneously, and leaves the distribution of the blood *in statu quo*, we find the mucous membrane of the larynx and trachea more or less injected, that is, of a cinnabar-red (*Vide* Plate VIII., Fig. 23), from isolated dendritic patches up to uniform coloration of the whole of the mucous membrane. This cinnabar, or crab-red colour, must not be confounded with the dirty cherry-red, or brownish-red colour which the mucous membrane of every trachea attains by putrefactive imbibition, and to which we have already directed attention (*vide* § 22, Gen. Div. p. 45, Vol. I.). When we find a "dirty" coloration of the tracheal mucous membrane, so often mentioned as existing after suffocation in carbonic oxide gas, it very often indubitably is only this putrefactive imbibition which has been mistaken for something specific. When, however, we find *a carbonaceous deposit* (soot) upon the tracheal mucous membrane of those thus suffocated, quoted as a point in the differential diagnosis, this merely happens from mistaking suffocation in smoke for suffocation in carbonic oxide gas. In the latter case, when the gas is *pure*, such a deposit is never found in the trachea, in the former always; and of this the illustrative cases following will contain ample proof (*Vide* Cases CCLVII.—CCLX.). There is also usually present in the trachea a greater or less amount of fluid, consisting of a mixture of air, mucus (serum), and blood, in the form of from a few small frothy vesicles up to an amount of colourless or bloody foam sufficient completely to occlude the tracheal cavity, and which is readily forced upwards by the putrefactive evolution of gas, and wells out of the mouth and nose of the corpse. The greater or less amount of this fluid depends upon whether the suffocation has been sudden or gradual; in the former case, therefore often in the case of those strangled or choked, there is less of it found, while in the latter, where a long respiratory struggle has preceded death, as when suffocation has occurred in carbonic oxide gas, or under water, large quantities of frothy fluid are found. I may also direct attention to the fact that this appearance, though not found in the trachea, may yet exist in the bronchial tubes, and may be brought to light by careful pressure on the lungs, while they lie as yet untouched, as by this means the frothy fluid is forced out of the bronchi into the trachea, in which it may be seen to rise. This valuable mode of investigation is easily applied, and has been, at my suggestion, included in the new Prussian "Regulations" (*Vide* p. 90, Vol. I.). There are, however, cases in which the trachea and its branches is perfectly empty, but such cases are rare. Finally, in the trachea of those suffocated, foreign bodies of every kind may be found, as mud, sand, vegetable fragments, human ordure, urine, &c., in those that have been drowned in such fluids, or in water.

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* Lehrbuch der Geburtshülfe. Leipzig, 1855, s. 837.

† Schwartz, *op. cit.*, ss. 83, 87, 228.

§ 41. CONTINUATION.

These primary phenomena found on dissection are necessarily accompanied by their secondary results: *Hyperæmia of the abdominal and cranial organs.*

(10.) The former is particularly well marked in the ascending *vena cava,* which is unable to empty its blood into the heart, already over-distended and paralysed, and which is always found greatly congested. All the other veins, particularly those of the omenta and mesenteries, are also congested.

In regard to the abdominal organs, I have not found the hyperæmia so constant in any one of them, not even in the liver, usually so full of blood, as in *the kidneys;* the amount of blood contained in these organs in those suffocated is so great that it cannot escape notice. The bright purple appearance so often observed on the external surface of *the intestines* in those suffocated is also the result of venous congestion.

(11.) We must also reckon *hyperæmia of the cranial cavity* among the secondary results observed on dissection; hyperæmia of the sinuses, as well as of the vascular meninges, and of the brain itself, from the hindrance to the return of the venous blood; apoplexy of the brain, therefore, secondary to apoplexy of the heart and lungs. But this hyperæmia occurs in various degrees and is often but little visible.

The evidence afforded by external inspection is much less certain than that we have just described.

(12.) Though *the face* of one suffocated is generally described as of a more or less bluish-red, swollen, and with protruding eyes, yet I can positively state that the reality very rarely resembles this picture. Far more frequently the countenance and physiognomy of the body after *every kind* of suffocation, and not only where death has occurred from neuroparalysis, differs in no respect from what is observed after other kinds of death!

(13.) I have already* pointed out that the protrusion of the tongue and the clenching of it between the teeth or jaws, which is generally to be found cited as an evidence of death from suffocation, is *by no means peculiar* to death from this cause—though I do not deny that it is often found after it—for very well-marked cases of suffocation occur in which the point of the tongue is found lying, as usual, *behind* the teeth; and, on the other hand, the tongue is often found clenched between the teeth after death from other causes, such as hemorrhage, poisoning, &c., of which the cases given in this work afford numerous examples. No importance is therefore to be attached to this appearance, and the recollection of this may be of the *greatest consequence* in doubtful cases which are difficult to decide, for instance, in regard to the question whether a body has been strangled before or after death?

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* Gerichtliche Leichenöffnungen, 3 Aufl., s. 155.

(14.) Finally, the appearance *of froth* coming out of the mouth is certainly very often observed in the bodies of those suffocated in any way whatever (p. 129, Vol. II.).

But this is not a constant phenomenon in such cases, while on the other hand, it is well known how often after every possible (even perfectly natural) kind of death, froth is observed to escape from the mouth as a purely cadaveric phenomenon, the result of the commencement of putrefaction.

In doubtful cases of suffocation in irrespirable gases, the diagnosis may possibly be supplemented by the investigation of the blood. To this belongs the discovery of the complete destruction of the blood-corpuscles following suffocation in sulphuretted hydrogen, discovered by me (Case CCLXI.) and which waits to be confirmed by future observations.

For the reasons stated (p. 125, Vol. II.), as well as because it does not correspond with what is observed at most dissections, less confidence is to be placed in the supposition of Bernard,* that after suffocation in carbonic oxide gas the blood displays a red colour, which is durable, and may last even for weeks. He has not, any more than myself in the course of my numerous observations, ever found the blood-corpuscles altered. *The discovery of the fatal gas in the blood itself* is a more important matter, and when it is successful it is indubitably decisive. Hoppe was successful in this in the four cases (CCL.-CCLIII.) detailed below. If defibrinated blood is mixed with one or two volumes of caustic soda of spec. grav. 1.3, and well shaken, a black mucilaginous mass is obtained, which, when spread in thin layers upon porcelain, appears of a greenish-brown. Blood, however, *saturated* with carbonic oxide gas, treated in like manner, gives an almost firm coagulum of a red colour, which, spread in thin layers upon porcelain, appears of a vermilion or cinnabar-red. I have to

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* Leçons sur les effets des substances toxiques, Paris, 1857, p. 181.

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remark, however, that in my four cases Hoppe did not find the blood saturated with carbonic oxide, therefore the caustic soda test did not give so bright a colour as if it had been so. In subsequent medico-legal cases I have also convinced myself that the caustic soda test only gives an uncertain and inconstant result, unless where the blood is saturated with the carbonic oxide gas. From these cases it follows that suffocation may occur without the blood being saturated with the poisonous gas, and accordingly the possibility of restoring animation appears to depend on the degree of saturation of the blood. Hoppe, in fact, succeeded in detecting the presence of the gas in the blood of a person saved.*

The remarkable Case No. CCLXI. gave occasion for instituting a series of experiments on the action of gases upon the blood. Blood recently drawn was placed in four-ounce bottles (about an ounce in each bottle), these were then filled with sulphuretted hydrogen, chlorine and carbonic acid gas, and well shaken. The result was uncommonly striking. In the sulphuretted hydrogen the blood appeared scarcely to coagulate at all, and was found still quite fluid when examined eight days subsequently. The inky colour of the blood was so distinct that scarcely any one, uninformed of the nature of the contents of the bottle, would have taken them to be blood. The dichroism of the blood was also very visible on the white sides of the bottle, which at every shake exhibited a greenish lustre. The blood-corpuscles were, however, perfectly normal, their colour yellow, their edges sharp and circular, and the central mark distinct. Numerous extremely small deep-black molecules were partly uniformly scattered between the blood-corpuscles, and partly adhering in clumps floated among them.

On mixing the blood with the chlorine gas, immediate coagulation took place, which did not subsequently disappear. The coagulum assumed a dirty-green colour, and tarry consistence, and could be fitly compared to nothing but meconium. The thin and firm upper layer of this, as well as what stuck to the sides of the bottle, had a dirty-white appearance (coagulated albumen?). Under the microscope, this appeared to be composed of innumerable blood-corpuscles, completely deprived of their colouring-matter, imbedded in an amorphous colourless stratum; the meconium-like clot also contained blood-corpuscles deprived of their colouring-matter, but they appeared to be remarkably few in number. Their form was perfectly normal. The blood mixed with carbonic acid gas coagulated very rapidly, and assumed a dark cherry-red colour, which it continued to maintain, appearing like cherry jelly. The blood-corpuscles appeared round like balls, and not disk-shaped, without any central depression, of the normal size, and of a reddish-yellow colour.* In the course of Heidenhain's† experiments on the action of carbonic acid gas upon the blood, he found the colouring-matter changed to a "brown." But it is remarkable that he produced the identical change of colour in the hæmatin by treating it with hydrochloric, nitric, sulphuric, and acetic acids. With these observations may be compared H. Nasse's, and Harle's observations on the influence of carbonic acid upon the blood corpuscles of the mammalia, and Lehmann's experiments on the mixing of calves' blood with æther, arsenious acid, hydrochloric acid, organic acids, caustic potass, ferrocyanide of potassium, &c., in Lehmann's Text-book of Physiological Chemistry, II., 2nd edit., Leipzig, 1853, s. 139-141. But Lehmann warns, certainly very properly, against drawing premature conclusions from the apparent action of individual chemical substances on the corpuscles or other elements of the blood as explanatory of pathological and pharmakological processes. And I need scarcely say that a similar warning is still more necessary in regard to premature conclusions for medico-legal ends from investigations which as yet are but barely commenced. Moreover, it is evident that the experiments I have just related cannot, without further explanations, be applied in the elucidation of the phenomena which follow the inspiration of similar gases in the living lung, because, independent of the disproportion between the volumes of gas and blood in the experiments described, pure carbonic acid, or chlorine gas, or the fumes of nitrous acid or ammonia, can never be inhaled, because they immediately produce a spasmodic closure of the *rima glottidis.*

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* Virchow's Archiv. 1858, xiii. 1, s. 104. The statement in the text agrees with the supposition to which the result of Lothar Meyer's experiments led him, viz., that the fatal action of carbonic oxide gas is brought about by each atom of this gas coming in contact with the blood in the lungs, robbing it of an equal volume of oxygen, till the amount left in the blood no longer sufficed to maintain life. (Zeitschr. f. ration. Medicin, 1858, V. i. s. 89.)

When I repeat that, after making a careful dissection, it is not difficult to diagnose death from suffocation in accordance with the appearances just detailed, this only refers to bodies either perfectly fresh, or but just commencing to putrefy. If putrefaction be already considerably advanced, or absolutely ended, the diagnosis of a death of this kind is more obscured than that of any other. For the hyperæmiæ, which may have existed, vanish with the putrefaction and subsequent evaporation of the blood; the congested lungs, cardiac cavities and veins, &c., are now empty; in that, in this case most important organ, the trachea, the uniform chocolate-brown or dark coppery-red hue of putrefaction obscures the vascular injection of its mucous membrane, the frothy fluid which it may formerly have contained is also evaporated, and its cavity is empty, its mucous membrane dry. For these reasons, it is often in fact no longer possible, if the body be much putrefied, to determine, even with any degree of probability, whether death from suffocation has taken place or no.

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* I have to thank the physicians of the Charité Hospital, Dr. Biefel and Dr. Boettcher, for kind assistance in the performance of these experiments.

† Wunderlich, Archiv für physiol. heilk. 1857, I. 1 and 2, s. 230.

§ 42. HOMICIDE OR SUICIDE?

When foreign bodies have got into the air-passages and have thus proved the cause of fatal suffocation, the appearances on dissection may, but only in the rarest cases, be able to give the means of diagnosing, whether death has been caused by an unfortunate accident (for example, a bean sticking deep in the trachea of a child, an artificial palate which has fallen down upon the epiglottis during sleep, &c.), by suicide, or by the criminal act of a third party. In most cases of this nature, however, as in every other where this question arises, more light is thrown upon the matter by the combination of all the external circumstances which have preceded death, than by the dissection alone.* Experience teaches that the commission of suicide by stuffing the air-passages with foreign bodies is a most unheard-of affair, and in such cases, therefore, suicide can only be supposed probable under quite peculiar circumstances. Child-murder (in new-born infants) is, on the other hand, by no means unfrequently thus produced, though other modes are doubtless much more frequently selected. Case CCXXXI. gives a striking example of the great difficulty there may be in deciding such cases. Precisely the same may be said of what has been here reckoned as the second mode of producing suffocation, viz., by irrespirable gases. In France it is very common for suicide to be committed in this manner, particularly by carbonic oxide and sulphurous acid gases, whilst in Germany (and other countries) such a thing almost never occurs. The nature of the fatal gas, when it can be ascertained, the place where, and the circumstances under which the body was found, the social relations of the person while alive, &c., must all be taken into consideration in attempting to decide the question. Almost the only fatal gases which occur in medico-legal practice are, carbonic oxide gas, which is evolved both by burning coal and charcoal, nitrogen and hydrogen, which are not of themselves positively hurtful, but only prove injurious by displacing the oxygen in respiration, and the positively deleterious sulphuretted hydrogen, which kills instantaneously even when it constitutes but the $\frac{1}{800}$ of the volume of the air respired (found in old wells, drains and cesspools, &c.).

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* *Vide* Special Division, §§ 9, 14, 23, 37.

Carbonic acid gas, fatal by producing spasm of the glottis (found in all gas-baths, and in apartments in which there are large quantities of fermenting liquors), chlorine gas, phosphoretted and arseniuretted hydrogen, ordinary coal-gas (66 parts light carburetted hydrogen, 21 parts hydrogen and 12 parts carbonic oxide gas), sewer-gas (81 parts nitrogen, 13 parts oxygen, 2 parts carbonic acid, and 3 parts sulphuretted hydrogen gas) and the like, are not likely to trouble the medical jurist. I myself have only had experience in regard to carbonic oxide, carburetted hydrogen, sulphuretted hydrogen, carbonic acid and ordinary coal-gas.

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§ 43. Illustrative Cases.

Cases CCXXVI., CCXXVII., and CCXXVIII.—Suffocation by the Fall of a Building.

Three men sitting in a cellar were suddenly killed by the falling in of the newly-built three-storied house above them. Only one of them had received an actual injury, a fracture of the right thigh, and suffocation had been the common cause of their death. The oldest amongst them, G., aged 36, was an extremely muscular man. His countenance was of a cinnabar-red colour and much swollen, his tongue lay behind the teeth. Both lungs were strongly congested with dark fluid blood, the right side of the heart, however, only contained a moderate quantity, and the left still less. On the other hand, the appearances in the trachea were most exquisitely distinctive of death by suffocation, since the mucous membrane of both larynx and trachea were wholly of a bright-red colour, and their cavities almost completely filled with dark bloody froth. The liver, spleen and brain were also very considerably congested, and both kidneys were most strikingly so, being so remarkably turgid with dark blood as to appear almost black (*Vide* p. 130, Vol. II.).—In the second body also, that of G.'s brother, aged 26, both kidneys were so distended with fluid blood, that on being divided longitudinally it seemed almost to run out. In this case of suffocation the tongue protruded about half-an-inch beyond the mouth. The face was crimson and swollen. In the cavity of the trachea there was no dark froth, but a bright reddening of the mucous membrane. In this case the right side of the heart and coronary veins were perfectly turgid, less so the lungs, and the large venous trunks of the abdomen. —The body of the youngest and feeblest of the three, a journeyman, aged 20, likewise exhibited a purplish swollen countenance, and his tongue was also dark, swollen, and protruded three lines beyond the teeth. The trachea presented the same appearance as in the body just described, but the lungs of this one were much more distended with blood than in either of the other two bodies, and the abdominal veins were actually stuffed like sausages. Both kidneys, particularly the right one, were also turgid with blood, and there was a visible congestion of the brain.

CASE CCXXIX.—BURYING ALIVE.—SUFFOCATION IN SAND.

The perfectly fresh body of a powerful man was dissected two days after death, in July, the temperature being + 17° R. = 67°.75 F. Perfectly houseless, he had laid himself to sleep in a sandpit, and was there buried alive. The whole of his face was covered with sand. The tongue lay *behind* the teeth, and on it lay some sand. In the cranium there was nothing particular. The trachea was already coloured by putrefactive imbibition, and contained some bloody froth and *much sand* adhering to the mucous membrane as deep as the commencement of the bronchi. The lungs were turgid with blood and œdema, both sides of the heart were filled with perfectly fluid dark blood, and the pulmonary arteries were much congested. The œsophagus was empty. (The liver, which was in this case not much congested, weighed 6¼ pounds.) The stomach was empty, the urinary bladder very full, the kidneys congested, the vena cava full, but not distended.

CASE CCXXX.—DEATH FROM THE FALL OF A ROOF.

In the following case death occurred from Neuroparalysis (*Vide* p. 123, Vol. II.). A boy, aged nine years, was buried alive while sleeping in his bed, by the fall of the roof of his room, which formed the floor of another apartment, upon which wet bark had been heaped up, and the body was found covered with this to the depth of four feet. The head, ears and cheeks were purple, the eyes did not protrude, but the point of the tongue lay between the clenched teeth. The cerebral membranes and the brain were hyperæmic; there was no appearance of cerebral hæmorrhage, but the sinuses were tolerably congested. The lungs contained no blood (the abdomen being already green from putrefaction—in July). In the right side of the heart there was only about four drachms (imp.) of half coagulated blood; the left side and the coronary vessels contained no blood. The pulmonary artery was only moderately filled. (The thymus gland of this boy, aged nine, was still very large.) The trachea, already of a coppery-red from putrefaction, was empty. It was remarkable, however, to find the large abdominal veins turgid with dark fluid blood.

CASE CCXXXI.—SUFFOCATION OF A NEW-BORN CHILD WITH PEAT. HAS IT BEEN ACCIDENTAL OR INTENTIONAL?

Although this case, as well as the CCXXIXth one, is already sufficiently remarkable, from the fact that suffocation by pulverulent matter is an extremely rare occurrence, yet it also well deserves to be detailed in full from the extreme difficulty found in deciding whether the infanticide had been accidental or intentional. I shall presently relate how the jury decided it. On the evening of the 9th of July, G., an unmarried woman, secretly gave birth to a child, and according to the police indictment, was accused of having suffocated and buried it, placing above it a box filled with potatoes. The midwife, A., found the child buried in a hollow about six inches deep, with its face undermost, and the box placed above it. She described the hollow as being filled with a mass of loose earth, wood shavings, and peat refuse. The accused confessed that the child had indeed been alive, because it had moved its hands and feet convulsively, but she declared that it had never cried. Immediately after her confinement, she was called away by her mistress. "I therefore laid the child," she said, "upon some peat refuse, in a slight hollow near a potato box, shut the box, and went away. I therefore neither buried the child, nor covered it with anything, nor had I the slightest intention to kill it." Moreover, she stated that her confinement had taken her by surprise, and that she had torn the umbilical cord across. She also asserted that she had laid the child in the hollow "on its back, leaning slightly to one side;" while her master, who afterwards removed the child, found it "lying on its belly, and both back and face blackened with earth." A physician, who also saw the child lying in the position in which it was found, described it as "having almost the whole body blackened with earth; its mouth somewhat open, and in it a piece of black earth or peat could be seen." More earth was also observed in the child's mouth. On the 9th, we made a medico-legal examination of the body, which was indubitably that of a mature and viable (male) child. In the cavity of the mouth we found a piece of peat of the size of a hazel-nut; the point of the tongue lay upon the jaws. On further examination, it appeared that "the whole of the cavity of the mouth and pharynx was completely filled with a brownish-black powder, apparently peat. The mucous membrane lining this cavity, as well as that covering the tongue, was neither reddened, swollen, nor ecchymosed." Both lips were also blackened by the above-mentioned powder. The post-mortem stains were on the anterior part of the body, the whole of which was more or less covered with the powder. The umbilical cord, also blackened by the powder, had not been tied, and had also evidently not been cut but torn across. On the middle of the forehead, there was a faint but true ecchymosis, ¾ of an inch long and 3 lines broad. On the left side of the neck there were several isolated reddish-brown unecchymosed spots running into one another. The diaphragm was placed about the fifth rib. The abdominal organs displayed no unusual congestion, the vena cava was only moderately filled and the urinary bladder was empty. The mucous membrane of the larynx and trachea was of a bright-red, and in the former "a dirty-black mass, the size of a millet-seed, lay beneath the epiglottis." The lungs almost filled the entire cavity of the chest, and weighed, along with the heart, a trifle more than two ounces (imp.); their colour was throughout a bright cinnabar-red, here and there marbled with blue. They floated perfectly, and crepitated distinctly beneath the knife, emitting a bloody froth. The bronchi were empty and perfectly normal. The heart and its coronary veins were perfectly empty; it weighed about 11 drachms (imp.) In the pharynx there was here and there a little black greasy mucus adhering to the mucous membrane. The posterior half of the scalp was covered with a blood coagulum one line thick, and isolated similar patches were found on both parietal bones. The skull bones, which were uninjured, contained an unusual amount of blood, which was not the case, however, with either the brain or its membranes. The plexuses were very pale, the sinuses only moderately filled. It could be indubitably maintained that the child was mature and had lived after its birth. We assumed the cause of death to be "a sudden obstruction of the circulation, produced by stuffing the air-passages with some foreign body," and we pointed out the importance of the fact that the powder mixed with the natural mucus had been found both beneath the epiglottis and in the pharynx. We further remarked, that "such an obstruction of the circulation proves fatal by no means always by producing pulmonary or cerebral apoplexy, as is proved by very many cases of death by hanging, in which, notwithstanding the undoubted obstruction of the air-passages, neither the ordinary phenomena due to suffocation nor cerebral apoplexy are found in the body,* but the appearances found are more negative in character, as in the body of this child, and from this we deduce the occurrence of what is called nervous apoplexy. There might be room to inquire whether the child might not have died from nervous apoplexy produced by some other cause, such as the cold of the cellar, and that the peat-dust had in some way or other got into its air-passages after death. But any such supposition is at once completely set aside by the fact that this powder was found both in the larynx and pharynx, into which it could indubitably only be forced by a somewhat deep inspiration, so that the child must have been alive when the foreign body got into its air-passages. It is more difficult, however, to determine" (which we were expressly asked to do) "whether the powder has got into the air-passages by accident or design? There are few or no traces of any violence to be found upon the child. The finding of a blood coagulum upon the scalp and parietal bones cannot be reckoned as such, since this is very frequently found upon new-born children as a mere accident attendant on birth. We also consider the faint ecchymosed spot upon the forehead as of no consequence, since it is easily explicable from the position of the child lying on its face in the shallow hollow, as it was seen by trustworthy witnesses, whose evidence it confirms, while it refutes the assertion of the accused, that she laid the child on its back. The reddish-brown marks on the left side of the neck are more suspicious, and may perhaps have arisen from pressure by the fingers, but it is also perfectly possible that they may have been caused by hard pieces of peat, chips of wood, &c. Such suspicious-like marks are not, however, required to justify the supposition that the stuffing of the mouth, &c., has *not* happened by mere accident. We do not deny that the child might have died had it only been laid in the hollow described and allowed to lie there, nor do we deny that in such a case *a little* earth or peat dust, &c., might have got into its mouth during its final gaspings. But it is not to be supposed that so *complete* a stuffing of the mouth with foreign matter which *penetrated so deep* as the pharynx, and even into the larynx, could be brought about accidentally, and, as it were, negatively. For the fact just mentioned rather shows that earth had been already stuffed into the mouth as far as the fauces, where it never could have got by chance, while the child was still making attempts to breathe, by which the powder was drawn still further into the larynx." Accordingly we decided that the obstruction had not arisen by chance or negatively, but that it had been intentionally produced. In this case the jury gave a most remarkable verdict. Accepting our opinion, they found the accused guilty of having intentionally stuffed the mouth of the child with earth, &c., but—they found her not guilty of intent to murder, and she was acquitted! The verdict was, however, set aside, and the case brought before another jury, who condemned the accused to many years' imprisonment.

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* *Vide* § 49, Special Division.

CASE CCXXXII.—SUFFOCATION OF A CHILD BY A "ZULP."* WHETHER DID IT HAPPEN BY ACCIDENT, DESIGN, OR NEGLECT?

The following case was also an example of obstruction of the air-passages by an unusual foreign body. The three-months-old (female) child of an unmarried woman, already much emaciated and having a bed-sore, was found lying dead in bed, in August, after its mother had gone off to her work, leaving it alone in the room; and a medico-legal examination of the body was ordered. On examining the cavity

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[*] A small bag of sweetened pap stuffed into the mouths of children, in Germany, to keep them quiet.—TRANSL.

of the mouth, we found a so-called sucking-bag (zulp), one inch and a-half long, and half-an-inch thick, filled with bread-pap, and occupying the whole of the fauces. At the base of the tongue there was an acute angled patch, of a dirty, livid, reddish-blue colour, which was soft to cut, and not ecchymosed; and a similar patch was found above it, on the mucous membrane of the hard palate. The tongue did not protrude, and neither it nor the lips were swollen, nor was there anything unusual to be found in the fauces or pharynx. The trachea and larynx were quite pale, though the body was perfectly fresh; only here and there there were a few faint dendritic injections; they were also quite empty; pressure upon the lungs, however, forced some frothy mucus, with large bubbles (not mere foam or bloody froth) into the trachea. The lungs were, externally, normal, and contained little blood, which was also the case with the pulmonary artery, and the right side of the heart; the left side and the coronary veins were completely empty of blood. Anæmia was also the only thing remarkable in the abdominal and cranial cavities. The blood was of a dark colour, and tolerably fluid. We assumed death to have been caused by neuroparalysis, and that this had been brought about by suffocation with the foreign body described. The question, whether the "zulp" had got into the position where it was found, by accident or design, could only be answered by saying that there was no apparent proof of any intentional stuffing of it too deeply into the mouth, and that it was quite possible that the greasy and slimy little bag, which at first was only stuck between the lips of the child, into the anterior part of the mouth, should, by the movements of the mouth in sucking, and its own gravity, have gradually sunk backwards. That the pressure of the foreign body had produced no proper ecchymosis was easily explicable from the fact that death must have necessarily taken place suddenly; while the fact of there being a mark, faint as it was, was an evident proof that the little bag had not been stuck in after death—a supposition which, without this, could not, from the perfectly negative result of the dissection, have been otherwise determined. We were, however, also asked whether the accused had not been guilty of the death of her child by neglect? "This may have reference," we stated, "either (*a*) to the suffocation by the 'zulp,' or also (*b*) to the general treatment and bringing-up of the child. *Ad* (*a*), it is not to be denied, that by placing the child within a doubled pillow, and beneath a sheet covering its head, after placing a 'zulp' in its mouth, the accused must have been aware of the possibility of some accident happening to the child during her absence. But it must also be remembered that the same thing is done hundreds of times every day, without being followed by a similar result; and since, therefore, this part of the question must be decided upon with regard to the accused's character for indiscretion, &c., the medical jurists leave it for decision by other parties. *Ad* (*b*), it is indubitable that W. kept the child in a most unclean condition, and thereby neglected one principal condition necessary to its thriving. Less has been made out in regard to the amount of nourishment given the child; and we particularly mention the deposition, that the child got nothing warm at night, for the purpose of pointing out that it is by no means necessary for young children to get warm milk at night, and that this does not happen in innumerable cases, and under the best management. It is, however, certain that the child was found by us to be 'much emaciated,' and with patches of bedsores on it. Insufficient nourishment cannot indubitably be looked upon as the cause of the first-mentioned condition, because, even under more careful attention, internal morbid causes, not discoverable on dissection, *might* produce a condition of chronic emaciation, as is proved by the experience of medical men even in regard to the families of the wealthier classes; on the other hand, the bedsores evince a high degree of that neglect of general attention, which has been otherwise proved, particularly and specially in regard to cleanliness, and in leaving the child lying for long periods in one position, both wet and dirty, &c., under which circumstances bed-sores are easily formed, particularly in emaciated bodies. From these causes, therefore, viz. a probable, though not *proven*, deficient supply of nourishment, and a neglect of proper attention to cleanliness, which has been fully made out, and the bed-sores which have thence arisen, the child would have indubitably died in no long time, as is sufficiently proved by statistics which show the disproportionately great mortality of children in this condition, and particularly children having a similar origin. Since, however, the child has actually died from another cause, we must answer this question, having regard to all that has been already stated, that there are no *medical* reasons for assuming that the death of the child (which has died from neuroparalysis produced by suffocation with a 'zulp') has been occasioned by the neglect of the accused."

CASES CCXXXIII. TO CCXLIV.—TWELVE CASES OF NURSLINGS SUFFOCATED IN BED.

According to our former penal code, mothers and nurses were forbidden, under pain of imprisonment, to have children under two years old in bed with them. Of course contraventions of this peculiar statute were of frequent occurrence. The new penal code no longer recognises this offence. The public prosecutor, however, prosecutes all fatal cases of death from imprudence of this character, as cases of death from neglect (according to § 184 of the penal code); and we thus have still occasion, from time to time, to investigate cases of this kind medico-legally. In such cases the children die either because they fall asleep on the breast of the mother, often still holding the nipple in their mouths; or they squeeze themselves during sleep against the breast or some other part of the body of the mother; or while she is asleep they get under the bedclothes, and so die from some one of the various modes of suffocation—and this happens all the more readily that they have already gorged themselves with milk. — CCXXXIII. A three-months-old girl was found dead one morning at its mother's breast. Besides the usual signs of suffocation, we found the petechial ecchymoses, already described (p. 126, Vol. II.), in great numbers upon the heart, arch of the aorta, and right lung, which had the appearance as if they had been spattered with ink from a pen. The tongue lay between the jaws; the stomach was half-full of curdled milk; and the trachea was filled with bloody froth.—CCXXXIV. In this case also, a female aged one month, found dead in the arms of her nurse, without any external trace of violence, the signs of suffocation were extremely distinct. The whole of the heart was of a dark-blue colour, with innumerable petechial ecchymoses on the surface of the organ, as well as under the pleura of both lungs, particularly of the left one. The spleen was remarkably hyperæmic; the kidneys in this case less so. The lungs were turgid with dark treacly blood; the trachea very full of bloody froth. The tongue protruded for three lines beyond the jaws. In this case also the stomach contained curdled milk.—CCXXXV. The dissection of this child, a female aged two months, suffocated in its bed with its mother, was attended with similar results. Omitting the other signs of suffocation, I may mention that the surface of the heart appeared as if sprinkled with ink. The trachea was filled with bright-red froth; its mucous membrane was of a bright red. The child had drunk to satiety, for the stomach was perfectly full of coagulated milk. It is indubitable that such a distention of the stomach is highly favourable to the production of suffocation under similar circumstances; and I am convinced that death from this cause is much more frequent than comes under the cognizance of the law. Even private practitioners may often enough conceal its occurrence, for reasons which can be readily understood, and then the death is entered in the official lists under the head of "convulsions," &c. Moreover, post-mortem stains were found upon the sexual parts and the anterior parts of the thighs of the child, and from these I concluded that the child, after finishing its drink, had fallen asleep on the body of its mother, and lain there till suffocated; and this the mother subsequently confirmed. The *foramen ovale* was, in this child, aged two months, still quite open.—CCXXXVI. I found precisely the same appearances in a boy aged two months, found dead in bed with his mother one morning. In this, as well as in (CCXXXVII.) another case of a girl aged nine months, also found dead in bed with her mother one morning, apoplexy was nevertheless found to have been the cause of death, and not asphyxia. —CCXXXVIII. In this single case, that of a six-weeks-old girl, who went to bed quite well at night, with her nursing mother, and was found dead in bed next morning, the appearances on dissection were perfectly negative. There was, particularly, no hyperæmia of the thoracic, abdominal, or cranial cavities, and the trachea was completely empty and normal, &c. We were therefore compelled to assume neuroparalysis as the cause of death.—CCXXXIX. On the other hand, in the case of a boy four weeks old, who had died during the night under precisely similar circumstances, suffocation from pulmonary apoplexy was again very distinctly marked. The right lung was strewn with petechial ecchymoses, of which there were fewer on the left lung and the heart; both lungs had not the bright rosy marbled colour usual at this age, but were dark bluish-red from hyperæmia, whilst the right side of the heart contained but little blood, and the left side none at all, the cranial cavity displayed only its usual moderate amount of blood, and the trachea was reddened, but empty.—CCXL. The appearances found in the body of a boy, just nine days old, were perfectly similar. At three o'clock in the morning, it had been nursed in bed by its feeble-minded mother, and at six it was found dead beside her. In this case also, pulmonary apoplexy was the form of death discovered. The tongue lay behind the jaws. The trachea in this perfectly fresh body was empty, and only faintly ecchymosed in isolated patches. The lungs were turgid with dark treacly blood; the inferior lobes of both lungs were covered with petechial ecchymoses; the colour of the lungs was a dark brownish-red, faintly marbled; the large blood-vessels were much congested, but the heart only contained a little blood in its auricles. The stomach was half-full of milk. The liver, kidneys, and vena cava were much congested. In the cranial cavity, the sinuses alone contained any remarkable amount of blood.—CCXLI. The trachea of this child, a four-weeks-old boy, which had been found dead in bed with its mother, displayed a rare and unusual appearance, inasmuch as, though its mucous membrane was strongly injected, it contained no froth, but only a thread of blood-coagulum, a line thick. The flattened nose, and post-mortem stains upon the face, distinctly pointed out what had been the position of the child at death. The brain and its sinuses displayed not only hyperæmic congestion, but actual hæmorrhage, which is extremely rare under the circumstances, for a coagulum of effused blood, one line thick, was spread over the whole surface of the brain. The lungs were of a dark reddish-blue, very full of blood, but, as also in all the previous cases, still capable of floating; the large thoracic blood-vessels were very full of a dark fluid blood. Both sides of the heart, even its right one, were only moderately full of blood. The stomach was quite distended with curdled milk. The intestines and bladder were empty.—CCXLII. The suffocation took, in this case also—that of a boy aged three months—the form of pulmonary and cardiac apoplexy. The body was kept so fresh by the use of ice, that at the dissection, six days after death, during mild December weather, with the thermometer at + 3° R. = 38°.75 F., there was not the slightest trace of putrefaction visible. There was moderate congestion of the cranial cavity; the larynx and trachea quite empty—the latter faintly injected; the blood treacly; the lungs dark brownish-red, and very hyperæmic; the right side of the heart very turgid, the left empty; the abdominal organs and veins much congested, and the stomach again distended with half-curdled milk.—CCXLIII. This most interesting case deserves to be minutely detailed. The child of the married woman H., which she had taken into bed beside herself, died during the night between the 12th and 13th November, without having had any important previous illness. It had been born on the 10th of the [illegible] was consequently just two days old. [illegible] the child, a girl, still alive, out of [illegible] so hoarse that "it could scarcely [illegible] again took it into bed with her at night, and [illegible] her arm close to her body. [illegible] she discovered that the child was dead. The medico-legal examination brought to light the following important particulars:—The child, perfectly mature, was of the usual [illegible] the green colour of commencing putrefaction was visible. The eyes did not protrude, and the tongue lay behind the jaws. Both lips were of a blackish-blue, hard to cut, and slightly excoriated. No other external injuries were visible. The diaphragm was placed high, between the fourth and fifth ribs. Beyond considerable congestion of the vena cava, there was nothing remarkable in the abdomen. Both lungs completely filled the cavity of the thorax. They were coloured tolerably uniformly throughout of a bright brownish-red. Along with the heart they weighed not less than five ounces (imp.). The pericardial fluid was bloody. A more careful inspection of the lungs showed that in this case also there were petechial ecchymoses under the pleura, and that they were also sprinkled over the entire surface of the heart. I had never before seen them so numerous. The heart weighed about one ounce (imp.), and its coronary vessels were turgid with blood. The lungs, still connected with the heart, did float, but showed, nevertheless, a tendency to sink. Separated from the heart, *the left lung floated perfectly, even in its smallest parts, while the right lung sank completely,* and only a small bit of it, the size of a bean, was, as we subsequently ascertained, capable of floating. Incision previously made into both lungs had produced a crepitating noise, and given vent to an unusually large quantity of dark frothy blood. Air-bubbles ascended from the portions of the left lung when forced under the surface of the water, but not from those of the right. The trachea was empty; its mucous membrane faintly injected. Both sides of the heart, particularly the right, contained dark *coagulated* blood. Within the cranium, the vessels of the pia mater and the sinuses alone were visibly hyperæmic. There could be no two opinions in this case; and, as in all the previous cases, it was not difficult to arrive at. It was evidently a case of death from suffocation, and it was all the more probable that it had occurred in the manner described by the mother, as the attending physician had described the child as "constitutionally affected with a weakness of the chest;" since, further, the witness already quoted had observed the child to be unusually hoarse on the night before its death; and, finally, since the dissection revealed that pressure must have been made on the lips, and that certainly by the breast of the nursing mother, upon which this child, as in every similar case, lying sucking, had died for want of air. In regard to the *docimasia pulmonaris*, the case also, though not new and unheard of, was still remarkable.—CCXLIV. A boy aged ten weeks was covered over with the bedclothes when asleep, and died beneath them. The countenance, gums, and tongue were very pale, and yet the pia mater and sinuses were found to be tolerably hyperæmic. The cause of death was discovered to be hyperæmia of the right lung and pulmonary artery, the latter being turgid with dark fluid blood. Both sides of the heart, particularly the right auricle, were remarkably distended. The trachea was pale and empty. The stomach in this case also was filled with curdled milk. In the abdomen the spleen, which was relatively large, and the liver, were distinguished from the other abdominal organs by their hyperæmic congestion, the vena cava being, on the other hand, only moderately filled.

Case CCXLV.—Suffocation in Carbonic Oxide Gas.

This was the case of a man aged 30 years; and, from the attendant circumstances, was probably one of suicide. The whole head of the body was red from post-mortem staining (not from ecchymosis). In this most exquisite example of death from suffocation, the tongue again lay behind the teeth. The cranial bones, as well as the whole of the brain, were unusually hyperæmic; the sinuses strongly congested with blood of a watery consistence. The mucous membrane lining the larynx and trachea was wholly of a cinnabar-red from vascular injection, and their cavities were perfectly filled with white froth. The lungs were extremely congested; and the bronchi, down to their ultimate branches, filled with similar white froth. The pulmonary artery contained much dark and fluid blood; the right side of the heart contained much *half-coagulated* blood—the left was almost empty. Here, again, the vena cava ascendens was perfectly turgid, and there was visible congestion of all the abdominal organs.

CASE CCXLVI.—SUFFOCATION OVER A CHAFINGDISH, FROM CARBONIC OXIDE GAS.

An old woman, aged 74, had placed herself, when drunk, one day in winter, kneeling with her head over a chafingdish of live coal to warm herself. She had probably soon become insensible, and was suffocated. The conjunctivæ of both eyes were of a cinnabar-red, and truly ecchymosed; but the heat of the coals was probably more influential in producing this than the suffocatory character of the death. The tongue was protruded for a few lines beyond the teeth. The flattened features, the post-mortem stains over the whole anterior surface of the body, and the stainless back, all distinctly showed that the deceased had fallen on her belly when dying, and had remained lying thus till she was discovered. The body was supple, and its belly already (in a frosty December) green from putrefaction. The vascular meninges, and all the sinuses, were very full of dark fluid blood; the substance of the brain was also much congested. The appearances in the trachea, which certainly was free of froth, were of no value, for it was already stained the coppery-red of putrefaction, to which I have previously directed attention. The lungs were dark-coloured, and turgid with bloody froth, so that they completely filled the thoracic cavity almost as after death from drowning. The large thoracic vessels were most unusually turgid with blood, as were also the right side of the heart and its coronary veins, while the left side contained but very little blood. In this case also, blood coagula floated about in the very fluid contents of the heart. The abdominal vessels and organs were distinguished only by their remarkable congestion.

CASE CCXLVII.—ERRONEOUS SUPPOSITION OF SUFFOCATION IN CARBONIC OXIDE GAS.

This case, apparently precisely similar to the previous one, shows how cautious we must be in taking it for granted that death has occurred from charcoal vapour. A woman, aged 65, was described in the police report as having been "suffocated in charcoal vapour," because she had been found dead beside a chafingdish. We found the whole face partly covered with dried-up vesications; and partly, particularly the forehead, eyes, nose, and lips, with ashes burned in. The body was extremely emaciated. The trachea was quite pale, and quite empty—even pressure on the lungs failing to bring anything into it. The lungs contained no blood; neither did the left side of the heart, whilst the right only contained about an ounce (imp.) of perfectly normal blood; the pulmonary artery contained but little blood, as did also the liver, spleen, kidneys, and vena cava. (Large hydatids were found in both kidneys; the hypertrophied gall-bladder was full of gall stones, and the aorta was ossified for four inches in the lumbar region.) Here, therefore, there was no proof whatever of death from suffocation in carbonic oxide gas; whilst it was evident that the old woman had, either while drunk, or stupid with sleep, fallen upon the chafingdish over which she was set, and had thus *burned* herself, and died from neuroparalysis.

Cases CCXLVIII. and CCXLIX.—Suffocation in Carbonic Oxide Gas.

(CCXLVIII.) The body of this man, aged 30, was, on the third day after death, still quite stiff and fresh, the temperature being — 12° R. = 5° F. The countenance was pale, but soiled with dried blood, which had come from the nostril; the eyes were not at all projecting; the point of the tongue was slightly enclosed between the teeth. There was no hyperæmia within the cranium. The lungs were of a slate-grey, therefore of normal appearance; not hyperæmic, but very œdematous. In the left side of the heart a teaspoonful, in the right two tablespoonfuls of dark blood, fluid as water, with which also the large thoracic vessels were turgid. The mucous membrane of the larynx and trachea were streaked with cinnabar, and the vascular injection could be easily recognised with a magnifying-glass. On this mucous membrane there lay a thin stratum of bright bloody froth, which could be forced in large quantity into the trachea by pressure on the lungs. The liver was congested; the whole of the mucous membrane of the stomach was visibly injected, its folds considerably elevated, and of a purplish-red. The small intestines were of the bright-red colour usual in cholera; the kidneys, vena cava, and mesenteric veins were very much distended with dark fluid blood.

(CCXLIX.) Precisely the same appearances, only the bright bloody froth was absent from the trachea, which in this case also was streaked with cinnabar, were found in the body of a dyer, aged 28, who was suffocated in bed by carbonic oxide gas, in January, 18—

and was dissected four days after death, the cadaveric stiffening being still present (the temperature being + 2° R. = 36°.5 F.). The gastric rugæ were also in this case not elevated and purplish-red, but rather pale and normal, and the blood was more of a cherry- than a black-red colour.

CASES CCL. TO CCLIII.—FOUR CASES OF SIMULTANEOUS SUFFOCATION IN CARBONIC OXIDE GAS.

(CCL.) Four powerful young journeymen butchers, aged from 20 to 25, were suffocated in bed one November. On the fifth day after their death, the bodies, still fresh, were examined. None of them had any deposit of charred matter or soot on their face or in their trachea (*Vide* p. 129, Vol. II.). In all, the tongue lay behind the teeth; all were yet stiff (from the rigor mortis), and all the four were soiled with excrement. In A. the mucous membrane of the trachea was scarlet from vascular injection, and a great quantity of mucus, frothed with minute air-bubbles, could be pressed upwards out of the lungs. The lungs were œdematous, and did not contain much blood; the large vessels were, however, distended with dark fluid blood, only one teaspoonful of which was contained in both sides of the heart. The liver was normal, the kidneys hyperæmic. The stomach contained potatoes, and exhibited a few isolated purple stains ("stases") at its fundus. The intestines were normal. The vena cava was turgid, and contained also a few blood coagula. There was but a small quantity of blood within the cranium.

(CCLI.) In B., the closely-adherent lungs were unusually œdematous, the trachea injected of a rosy-red and full of froth; the left side of the heart contained three teaspoonfuls of very dark (once more) coagulated blood, the whole of the right side, however, as well as the pulmonary artery, were truly turgid. The liver also, kidneys and vena cava, were remarkably hyperæmic. There was nothing remarkable either in the cranium or stomach.

(CCLII.) In the body of C. the lungs were precisely the same as those of B., only containing rather more blood. The trachea was perfectly scarlet, and contained an unusual quantity of white froth. The left ventricle contained a teaspoonful and a-half of dark coagulated blood; the right ventricle and the pulmonary artery were turgid with completely coagulated blood, and this was also the case with the vena cava. The liver was large and contained much dark blood, the spleen and kidneys contained less. The cranium and stomach were as in B.

(CCLIII.) Similar appearances were also found in this body. Very hyperæmic lungs; much white froth in the trachea, which was perfectly scarlet from vascular injection. The left side of the heart was almost turgid with dark partially coagulated blood, but the right was actually almost bursting, and its auricle so enormously distended with blood coagula, that I have never seen its like. The pulmonary artery was also distended with partially coagulated blood. The liver, kidneys, vena cava, pia mater and sinuses were only moderately filled, and they could not be expected to be otherwise, considering the anormal distribution of the blood.

CASES CCLIV. AND CCLV.—SUFFOCATION OF A MARRIED COUPLE BY CARBONIC OXIDE GAS.

On the fourth day, after death in November, the temperature being − 2° to + 3° R. = 24°.5 to 38°.75 F., there were delivered to us for dissection the bodies of a married couple, who had been found dead one morning in their poor sleeping apartment, having been seen in apparent health the evening before. To warm themselves they had placed a chafingdish full of live coals upon the table, and its vapour ere long began to affect the inhabitants of the neighbouring apartment, two of whom, as we afterwards learned, became giddy, but were restored by the door being opened. Nothing was heard of the old couple till next morning, when the man, aged 60, was found dead in bed, and his wife, aged 56, also dead, sitting by the table close beside the now extinguished coals. The remarkable difference in the degree of putrefaction of the bodies of these two persons, who had lived and died under precisely similar circumstances, and who were also nearly of the same age, and both organically healthy, affords a fresh example of what we have already stated (§ 14, p. 31, Vol. I.) as to the unknown individual conditions which modify the advance of putrefaction. The abdominal coverings of the man were already quite green, and the trachea had the brownish-red colour of putrefaction, while the body of his wife was perfectly fresh. The heat of the bed, which in the case of the man could only have been active for but a few hours, affords, of course, no explanation of this difference. The eyes of both bodies were closed, and the expression of their features was that of quiet repose. The man's tongue lay behind his teeth. The whole of the cranial cavity was visibly anæmic. The larynx and trachea were quite empty. The lungs were of the normal colour, contained a moderate amount of blood and of cadaveric œdema. The heart contained in all its four cavities a small quantity of blood of a watery consistence. The large blood-vessels also contained but a small quantity of partly fluid, partly coagulated, blood. The blood-corpuscles (in both bodies) were in no ways anormal. The liver, spleen and kidneys were remarkably anæmic; the stomach was quite empty, and its internal surface normal. In the intestines there were also neither congestion nor unusual discolorations, and the vena cava contained only a small quantity of treacly blood. These perfectly negative appearances in the body were certainly remarkable and unusual. On the other hand, the appearances in the body of the woman were of a much more positive character. In this case also the tongue lay behind the teeth, and the brain and its sinuses were remarkably anæmic. The trachea was pale, without a trace of vascular injection and empty, but pressure on the lungs forced some frothy water into it. Both lungs were anæmic. The right side of the heart was remarkably distended with very dark, treacly and half-coagulated blood, of which the left side contained only one teaspoonful; but the large thoracic blood-vessels were also stuffed with similar blood. In regard to the abdomen I have only to remark, that the normal stomach contained a tablespoonful of a yellowish fluid, and that the inferior vena cava, as well as all the organs, contained but a scanty supply of blood.

CASE CCLVI.—SUFFOCATION IN CARBONIC OXIDE GAS.

In this case, that of a woman aged 24, suffocation occurred very slowly, since she was found still alive but senseless, and breathing stertorously; she was bled and removed to an Hospital, but died on the way thither. Three days after death we found the cadaveric stiffening still perfect in the inferior extremities of this suffocated person (p. 125, Vol. II.), and incomplete in the superior extremities. The rapid putrefaction of the bodies of those suffocated (p. 32, Vol. I.) was remarkably exemplified in this case, the abdominal coverings being already quite green on the third day after death, in November (temperature — 1° to 3° R. = 29°.75 to 25°.25 F.). The tongue lay behind the teeth. The brain was not hyperæmic. The trachea exhibited cinnabar-red vascular injection, but the most of it was already stained of a deep chocolate-brown by putrefactive imbibition; it contained only a little bloody fluid, a great quantity of which was forced into it by pressure on the lungs. The lungs appeared rather pale than too dark. All the cavities of the heart, particularly the right ventricle, the coronary vessels and the large thoracic trunks, were distended with very dark and *strongly coagulated* blood. Neither the liver, spleen nor kidneys contained much blood. There was a large fibrous tumour of the uterus and also hydatids. The shift was soiled with involuntary evacuations both from the bladder and rectum.

Cases CCLVII. and CCLVIII.—Suffocation in Smoke.

Two inmates of an asylum, the one for eighteen and the other for fifteen years, aged respectively 50 and 32 years, the one fatuous from childhood, the other insane, were found dead in their beds one day in January. The nurse had, at five o'clock in the morning, while they both slept, lighted a fire of peat and pinewood in the stove, which was heated from the inside, and had forgotten to open the badly-shutting damper. When she returned, two hours subsequently, she found the whole room filled with a stinking smoke, the stove burning and the two women dead. Even after having the windows open for three days, the room was still full of the smell of creosote, when we came to make the examination of the bodies. Both bodies displayed exactly the same appearances (and remarkably enough, the very same peculiar pathological product, inasmuch as there was in both an exostosis of the petrous portion of the temporal bone, which gave the *basis cranii* an oblique appearance). Both bodies were still quite fresh on the third day after death (temperature — 4° to 6° R. = 23° to 18°.5 F.), both quite stiff. The tracheæ of both were beautifully injected of a cinnabar-red, and filled with a frothy fluid, after the removal of which the mucous membrane of each larynx, and in a less degree of each trachea, was seen to be covered with soot. The lungs of both bodies were œdematous to a most extreme degree, normal in colour, and contained but a moderate amount of blood. The hearts and pulmonary arteries of both were empty, but the livers of both were turgid with dark fluid blood. The stomach of the eldest displayed on its fundus many dendritic purple-coloured congested patches, that of the youngest contained only one such patch. The spleen, and particularly the kidneys, of both, were strongly congested, and the large abdominal veins distended with blood.

Cases CCLIX. and CCLX.—Suffocation in Smoke.

On the third day after death, in May, the temperature being + 16° R. = 68° F., we examined the bodies of two brothers, aged respectively 10 and 6 years; who had been suffocated in the smoke of an accidental fire. The appearances on dissection were in both perfectly alike, without a single deviation. The bodies were quite fresh and still stiff, only the abdomens greenish coloured. The face and neck had a sooty deposit on them. The nostrils, pharynx, palate and tongue were covered with soot. In both the strong development of the papillæ of the tongue (from baking?) was remarkable. The veins of the pia mater were very distinctly injected of a bright red; the brain was normal, the sinuses moderately filled. The whole of the trachea (in both) was filled with frothy mucus, which was full of soot, its mucous membrane was wholly of a cinnabar-red from vascular injection. The lungs, which were œdematous and contained but little blood, exhibited in the eldest boy several small *subpleural ecchymoses*, and one or two the size of a bean; in the youngest boy there were only one or two small ones on the right lung. The blood in both bodies was of a tolerably bright-red and fluid. Both hearts were very flabby and contained, as did also the pulmonary arteries, only a very small amount of blood. The œsophagus of both was internally powdered with soot, the stomach was empty, and its mucous membrane normal; the liver and spleen contained but little, the kidneys much blood, the vena cava and the mesenteric glands were much congested.

Case CCLXI.—Suffocation in Carbonic Acid and Sulphuretted Hydrogen Gas.

By a rare and horrible accident *ten* powerful men were poisoned by some deadly vapour; only four of them were restored to life after the lapse of a longer or shorter time, while six died on the spot. In one of our large tanneries, a recently-finished large box, in which the hides were to be macerated, made of strong deal, 10 feet deep by 7 feet square, and sunk in the earth like a water-cistern, which was still empty and unused, was gradually elevated. This was supposed to be caused by some spring, as the neighbouring soil was very marshy, and the bottom of the box, which was open and uncovered, was perforated by a hole about 3 inches in diameter. A quantity of stinking water immediately poured into the box. One of the journeymen tanners descended by means of a ladder and baled the water out for about ten minutes, when he suddenly fell down dead. Another descending to his assistance had scarce reached the bottom when he too fell dead. The same was the case with a third. The master, a young, powerful man, now descended, but fell over the three bodies, and remained asphyxiated for three hours, but was ultimately restored to life. Most incomprehensibly, six more men went down one after the other, till at length all were hauled up with ropes. So soon as they got down, all without exception fell, and they lay, as an eyewitness said, "like herrings" one above the other! Next day I saw the six bodies. The expression in all was most peaceful; the eyes in all were closed and did not protrude, the tongues were behind the teeth; in all (in October, the temperature being + 5° to 9° R. = 43°.25 to 52°.25 F.) there was complete cadaveric stiffening thirty hours after death, in all numerous and large post-mortem stains upon their anterior surface; in two the face, and it alone, was of a greenish-yellow colour, a very remarkable phenomenon. No official examination of the bodies was required, and with some difficulty I obtained permission from the relatives to open one, viz., that of the young man, T., aged 30, who was the second to descend. The dissection took place thirty-eight hours after the instantaneous death. Rigor mortis was only present on the inferior extremities. On the body there were here and there patches of green from putrefaction, very remarkable, considering the damp cold weather, and the position of the body in a cold and airy loft. The brain was firm, its veins distinctly anæmic, and all its sinuses perfectly empty of blood; the remarkably dirty-grey colour of the cortical substance of both brains in this body, I could scarcely refer to commencing putrefaction, since the brain, under similar circumstances after other kinds of death, is not usually affected so early, still the colour was very like that of commencing putrefaction in the surface of the brain. The lateral ventricles were dry; the plexuses of a pale-livid colour. Nothing else remarkable within the skull. The lungs distended the thorax (as in persons drowned) and lay close to the ribs. Their texture was healthy, but they were all everywhere extremely hyperæmic. The blood in the lungs was of a colour I had never previously seen, namely, *exactly like ink*. Small spots, made by squeezing pieces of lung upon a clean board, appeared *precisely like ink-stains*, as all the by-standers saw and declared. The cut surfaces of the lungs also appeared perfectly black, without displaying any excessive amount of œdema. On the other hand, the external surface of the lungs was of a dark bluish-red colour, here and there broken with patches of cinnabar-red. The blood from the lungs, when examined beneath the microscope, exhibited a most remarkable and *complete destruction of the blood-corpuscles, scarce one of which could be recognised*. (The blood was kept in a well-corked bottle and examined the day after the dissection.) The pulmonary artery was distended with treacly blood somewhat less black in colour, as also, I may now mention, the *vena cava ascendens*. The heart was collapsed, the coronary vessels empty, the (hypertrophied) left ventricle perfectly empty, the right ventricle contained only a few drops, scarcely half-a-teaspoonful of blood. The larynx and trachea were remarkable. They were quite empty, and contained not a trace of froth; their mucous membrane was of a deep brown crimson-red colour, much darker and not so dirty as the usual colour of the trachea from putrefaction. This, however, being an organ which putrefies at so early a period, putrescence may, indeed, have had a considerable share in producing this appearance, but the dark colour of the blood was indubitably not without an important influence. The stomach was empty, and the whole of its mucous membrane uniformly stained the hue of wine lees; this colour also was no cadaveric phenomenon, since the colour of the putrefying mucous membrane of the stomach is a greyish livid hue, and never resembles the lees of wine. The liver appeared full of blood, the spleen and kidneys less so. The intestines had a somewhat dirty appearance, without exhibiting anything else remarkable. Accidental appearances were—fæces in the large intestines, and a half-full urinary bladder. I may also say that the hand could still perceive a degree of warmth within the thorax and abdomen (p. 125, Vol. II.). And when I add, that all the six bodies had externally the same appearance—except the greenish-yellow colour of the face of two of them already described—there seems a great probability that all the six, if dissected, would have presented the same appearances. It is difficult, or rather impossible, to decide with certainty on the nature of the fatal gas which killed these six men. A direct examination was under the circumstances no longer possible, and owing to the imminent danger to life attendant upon a reopening of the hole and descent into the box, the police would not permit this. We could therefore only proceed upon general data. The workmen could not speak enough of the strong smell of sulphur given forth by the water, which therefore must indubitably have been strongly charged with sulphuretted hydrogen; but it appeared to me just as indubitable that this gas had not been the *only* effective agent in producing death. It proves, indeed, very rapidly fatal, but it is not heavier than ordinary atmospheric air. The first workman had baled out the water for ten minutes unhurt, before he suddenly fell dead. Another gas must then, therefore, have come through the opening, since those who subsequently descended fell immediately. The only gas that is heavier than atmospheric air and sinks beneath it, is carbonic acid. According to the circumstances, therefore, we are forced to suppose the presence of this gas in the bottom of the large chest. Nevertheless, the share taken by the sulphuretted hydrogen is not to be denied. The actual black colour of the blood (sulphuret of iron) at once pointed in this direction, and counter-proofs have confirmed it. I allowed sulphuretted hydrogen to stream through the normal-coloured blood, taken from the perfectly fresh body of a person who died of consumption, and the blood acquired *the precise same inky hue* we have just described. In a second experiment made with carbonic acid gas and the same blood, it assumed, indeed, a dirty hue, but did not become at all black (*Vide* the experiments detailed p. 132, Vol. II.). We had thus indications of the presence of a mixture of carbonic acid with sulphuretted hydrogen gas. The so-called sewer-gas consists of a mixture of nitrogen, carbonic acid, and sulphuretted hydrogen. Whether there were any nitrogen in this gas, I have no means of showing. The existence of a portion of carbonic oxide gas may, however, be suspected, since it so readily allies itself with carbonic acid gas under circumstances similar to those described. When we reflect that all the poisonous kinds of gas hitherto investigated—the sewer-gas, the gas of graves and of night-soil, &c., are all combinations of different gases, so there is the greatest probability for supposing, that the fatal gas under consideration, which was developed in water beneath the surface of the earth, has also been a mixture of several kinds of gas, amongst which we may regard carbonic acid and sulphuretted hydrogen as having been certainly present.*

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* The opinion given above has been confirmed by a subsequent analysis of the water taken from the tan-pit by Dr. Sonnenschein, inasmuch as we have

CASE CCLXII.—SUFFOCATION IN CARBURETTED HYDROGEN AND CARBONIC OXIDE GAS. (RESIN GAS, ORDINARY ILLUMINATING GAS.)

In one of our oil manufactories, colophony and gypsum were submitted together to a dry distillation, by which a yellow fatty oil was obtained, which was used to lubricate machines. During the process resin gas was evolved; this is analogous to ordinary illuminating gas, and consists of a mixture of carburetted hydrogen with carbonic oxide gas and vapour of benzine. On Saturday the distillation was stopped, and on Sunday the cold retort was cleaned out, the refuse pitch being knocked out of it. This was usually done by the workman N., aged about 30 years, who on Saturday, the 10th of January, crept into this kettle or retort, probably to warm and rest himself after dinner. Another man also crept in along with him; he speedily became insensible, but was drawn out and restored to life. N. was dead, and six days subsequently we dissected the body. This was completely covered with soot, and had a few burned patches of skin on the thighs. Putrescence was only just beginning on the abdomen, and the rigor mortis was *still* present. The expression was remarkably peaceful, like one quietly sleeping, which the deceased probably was when he died. Spermatozoa were found in the urethra. The cranial cavity contained only a moderate amount of blood; the brain was firm. The lungs were normal in colour and size, and filled with a *bright-red* very fluid blood; the trachea contained no froth, but was, particularly just above and in the bronchi, strongly injected of a cinnabar-red. The large thoracic vessels, the cardiac coronary vessels, and the heart itself were not hyperæmic, and neither were the liver, spleen, nor kidneys, while on the other hand, the vena cava was turgid with similar blood. The stomach was distended with potato soup, its mucous membrane was, however, perfectly normal. The intestinal veins were much congested.

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there assumed that there is "very great probability" that the death of the unfortunate men was caused by respiring a mixture of carbonic acid and sulphuretted hydrogen gases; and the fluid, when examined, was found to contain twelve per cent. of carbonic acid, and thirteen per cent. of sulphuretted hydrogen by volume. *Vide* Müller und Ziureck, Archiv der Deutschen, Med. Gesetzgeb., 1858. Nr 8 u. 9.

CASE CCLXIII.—ASPHYXIA FROM INTERNAL CAUSES.

A steersman, aged 40, was said by his fellow-shipmate, who was alone with him in the vessel, to have suddenly fallen dead. As the statement appeared somewhat suspicious, a medico-legal examination of the body was performed. We found the most evident proofs of death from suffocation; turgid distention of the lungs (pulmonary apoplexy) of the right side of the heart and of its coronary veins with dark and perfectly fluid blood, reddish froth in the trachea, which was already of a brownish colour from putrescence; the cerebral veins and sinuses were only moderately filled. Therefore, as there was no trace of any injury or other external violence to be found on the body, we were obliged to suppose that death had occurred by asphyxia from internal causes. In a purely medical point of view it was certainly something quite unusual to see a powerful and organically healthy man die so suddenly by asphyxia from purely internal causes. Perhaps the great heat of an August day, accompanied with the violent bodily exertions of rowing and steering, aided perhaps by the free use of brandy, may have combined to produce this effect. But all this was of no consequence to the Judge after we had explained that death had been caused by internal causes, and we were, therefore, careful not even to hint at these probabilities in our provisional opinion—and no reasoned opinion was subsequently required of us. Similar cases often come before the medical jurist, and from my official position I happen to know how often the medical jurist, to his own damage and that of the science, takes up an erroneous view of such cases exactly because the correct one seems too simple. For that reason alone I have thought it right to relate this case.

CHAPTER V.

DEATH BY HANGING, THROTTLING, AND STRANGLING.

§ 44. GENERAL.

THE words hanging, throttling, and strangling are here employed in their ordinary acceptation. Hanging, therefore, is that kind of death produced by the more or less complete suspension of the body in a ligature which more or less completely surrounds the neck, the constricting force being the weight of the body itself; throttling is that kind of death produced by the powerful or continuous pressure of the fingers on the throat, either from one side to the other, or, more rarely, from before backwards; while strangulation is that kind of death produced by pressure made circularly round the throat by means of any kind of ligature. In all the three ways pressure is made upon the large blood-vessels, and the circulation to and from the heart impeded; it is also made upon several most important nerves, upon the hyoid bone, upon the larynx and trachea, and to this is often added an extension of the cervical spinal cord, and an instantaneous closure of the trachea. Now, though the nature of the death produced by these three modes is in general precisely similar, yet from the influence of so many causes capable of destroying life, of which sometimes the one and sometimes the other is originally most active, we can easily understand, what experience actually teaches, that the appearances on dissection of any given individual who has died from any one of those three kinds of death, which are to be regarded as identical, are by no means always the same. In general, those strangled—for we may thus collectively term this threefold kind of death—die from sudden interruption of the circulation in one of four ways:—from simple cerebral congestion (apoplexy)—from simple congestion of the thoracic organs in its various forms (*Vide* previous chapter), consequently from cardiac or pulmonary apoplexy—from a combination of the two, apoplexy and asphyxia—or, what is *far more frequently* the case than is generally supposed, though there do exist isolated observations of its occurrence by Orfila, Devergie, Eggert, Krombholz, Remer, &c., they die from neuroparalysis (nervous apoplexy). The cause of this kind of death has already been discussed in § 39 in regard to its production by suffocation.

As, therefore, we cannot lay down any definite scheme of post-mortem appearances applicable to every case of death from strangulation, as, moreover, the appearances actually found are by no means specific or peculiar to this kind of death, so there are also additional circumstances, about to be related, connected with this form of death, which render its diagnosis in this way one of the most difficult tasks which the medical jurist can undertake, though in a large practice he has it often enough to do. I have no hesitation in placing, in this respect, death from strangulation, far before death from drowning, and in saying that, *cæt. par.*, that is, the bodies being equally fresh, it is much more difficult to determine that a man was yet alive when he was strangled, than that he was yet alive when he fell into the water, that is, it is more difficult to determine the fact of death from strangulation than from drowning; while, on the other hand, it is indubitably more difficult to decide the question of homicide or suicide, in regard to death from drowning. With respect to the statistical relations of the various kinds of strangulation, experience teaches us that murders of this character are rarely committed by hanging, usually by throttling, and occasionally by strangling, but that usually homicidal violence inflicts some other kind of death, such as bodily injury of some kind, and very seldom takes to strangulation in any form. Conversely, death from throttling is never to be referred to suicide, from strangulation, only in the rarest cases, but from hanging, almost always.

§ 45. DIAGNOSIS:—(*a*) THE GENERAL EXTERNAL APPEARANCES.

We have to describe: (*a*) the general appearances seen on inspection of the body; (*b*) the local appearances on the neck; and (*c*) the internal appearances.

(*a*) How often do we read in purely theoretical authors (1.) of the *violet*, bluish-red, swollen *countenance* of those strangled! Nothing, however, is so erroneous as to suppose that every one hanged, &c., has such an appearance. Haller long ago published descriptions of persons hanged, who had a pale and sunken countenance, and numerous later observations of a similar character have been made; my own experience, however, has taught me that by far *the greatest number* of persons strangled have neither a turgid nor a livid countenance, but are simply like that of *any other corpse*. I refer, of course, to bodies either perfectly fresh, or at least not tainted with putrescence to any considerable extent. The three kinds of death make no difference in this respect, though bodily constitution may. Very muscular and plethoric men are found after such a death to have sometimes a very considerable turgescence of the head, with livid ears—an organ that more often than any other acquires a cyanotic colour, even in corpses whose countenance is pale—a violet countenance, and swollen lips. It is, however, practically important, and perfectly in accordance with experience, to conclude that no man has a right to say, that because a corpse has not such an appearance, but simply the usual pale countenance of a dead body, therefore the individual has *not* been strangled, or indeed to make use of this appearance in support of the counterproof to something else, since, as I have already said, most of those strangled have a pale, peaceful, and not a turgid countenance. 2. Precisely the same may be said of the *protrusion of the eyes*, which is seldom observed, and only when the countenance is very turgid. On the other hand, there is frequently ecchymosis of the *tunica conjunctiva*. 3. In regard to the *protrusion of the tongue*, or the clenching of it between the teeth and jaws, I have already (§ 41, p. 130, Vol. II.) pointed out the inconstancy and consequent untrustworthiness of this symptom, which is just as often absent as present in persons strangled, whether they have died from apoplexy, suffocation, or neuroparalysis. French authors (Belloc, Fodéré, Orfila) suppose that the position of the tongue within, or protruded from the mouth, depends upon the position of the ligature, and state that the tongue remained in its natural position when the ligature was placed above the hyoid bone, and that it was protruded when the ligature was placed beneath the larynx. Fleischmann, on the other hand, supposed that the position of the tongue depended upon whether death occurred during ex- or inspiration. Devergie, whose observations agree with mine, has most properly opposed both of these views. I have already stated, and numerous proofs in support of this statement will be found in this work, that the tongue is found protruded or clenched between the teeth after every possible kind of death, after drowning, hæmorrhage, poisoning, &c. From this it is sufficiently evident that the "position of the ligature" can have no influence in producing this condition. Repeated observation has convinced me that the symptom is wholly untrustworthy. (4.) Turgescence of the male, and even (according to Remer) of the female *genitals;* that is, in males semi-erection, with escape of the seminal or prostatic fluid, and in females a vagina moist with mucus. The oftener I have occasion to investigate the bodies of those strangled, the more I am convinced that this also is a dogma which has crept into forensic medicine, taken upon trust from one handbook into another, without ever having been tested by experience or correct observation. Guyon,* an utterly unknown surgeon of the French navy, reports the case of fourteen negroes hanged simultaneously, who were all stated to have had erections at the moment of death, and that this erection was still visible in the bodies of nine of them one hour after death. The first question that occurs is, what was the subsequent condition of the bodies, and how short a time did the turgescence of the other five that were also hanged take to disappear? And the next and most important one is, whether an actual erection which has taken place at the moment of death, can subsequently disappear, regurgitation having ceased, before the setting in of general putrefaction? But theoretical objections should never lead us astray, provided experience confirms the facts said to be observed. It does *not* confirm them, even though textbooks, from which better things might have been expected, state the contrary. In *not one single instance* of the very many persons hanged examined by me, most of whom were indubitable suicides (were therefore alive when hanged), have I neglected to examine the condition of the genitals, and in not one single case have I found an erection of the male organ. Sometimes, but only in the rarest cases, it has appeared to me and to the bystanders as if there were present a certain amount of turgescence, a sort of semi-erection, but such an observation is too deceptive and uncertain for any value to be placed on it. The whole question of erection, even of a very transitory nature, would have a more certain basis, were the *discharge of semen* in persons hanged as frequent as it has been stated. But even this is by no means the case. It is astonishing to see an author like Devergie state, that seminal stains are "unusually frequent" on the linen of persons hanged, though he at the same time states that he has never observed either erection or semi-erection of the genital organs. It does not, however, appear from his statement whether these stains were of recent origin or not, nor whether they were accurately tested, that is, their existence positively determined by the microscope. I have often enough observed a little mucous fluid at the urethral meatus, but I have only in the rarest cases found any spermatozoa in it; for instance, in the case of a very powerful leather-dresser, aged 58; in another powerful man, aged 40, who had (as often happens), hanged himself in a noose, so that the mark of the ligature went uninterruptedly round the whole (even the back) of the neck; in a journeyman, aged 29, who had also hanged himself in a noose, and in a few other cases. But another circumstance, with which I have only recently become acquainted, lessens still more the diagnostic value of the discovery of a seminal discharge. For the continued examination of the contents of the urethra, particularly in those who have suddenly met with a violent death, has enabled me to discover spermatozoa in the urethra of those shot, several times in those suffocated in irrespirable gases (Case CCLXII.), also after poisoning with hydrocyanic acid (Case CCIV.), and very plentifully in the case of a man, aged 29, who was found drowned. It would, however, be certainly unjustifiable to suppose that all these men had had sexual connection just before death! Moreover, as regards the condition of the female genitals, it is evident that a perfectly unintentional deception may so readily occur in regard to them that this symptom is to be looked upon as perfectly worthless. In no case, therefore, can the condition of the sexual organs of either sex be accepted as affording a diagnostic symptom of any value in regard to death by strangulation.

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* Révue médic., 1823.

(5.) The escape of *excrement* and *urine* at the moment of death. Not always, but very often the linen and clothes of the body are found soiled with one or both of these excretions under circumstances which exclude the idea that they have only escaped through the open sphincters during the transport of the body. But the absence of this phenomenon is just as little to be taken as evidence against the supposition of death from hanging, as its presence is to be accepted as proof thereof, for this soiling is daily found on the bodies of those that have died from every possible cause, particularly those that have died suddenly, even when the death has been perfectly natural, and this is physiologically explained by the fact that every disturbance of the circulation quickens the peristaltic action.

§ 46. CONTINUATION :—(*b.*) THE LOCAL APPEARANCES ON THE NECK.—THE MARK OF THE CORD.

(*b.*) In every case of death from strangulation the appearances on the neck will afford the most important information, and in regard to this, the soft parts as well as the bones, cartilages, and blood-vessels, have been subjected to the most careful scrutiny.

(6.) *The mark of the cord.*—It is well known that all the earlier authors assumed a bluish-red, ecchymosed impression of a ligature round the neck to be a never-failing proof of death from strangulation; and, from P. Zacchias down to Foderé, and later, they taught that a visible ecchymosed mark round the neck was a certain proof that the hanging had taken place during life, while, on the other hand, the absence of an ecchymosed mark beneath the ligature was as certain a proof that it had been placed round the neck after death, and therefore that death had not been caused by hanging or strangling. Daniel* was the first who wrote—*male, ecchymosin semper locum habere hactenus docuere medic. forens. scriptores.* And this doctrine was shaken to its foundation about the commencement of this century by the observations of Merzdorff, von Klein, Hinze, Remer, Fleischmann, Esquirol, &c. More than five-and-thirty years ago (1826), I endeavoured to clear up this important subject by means of experiment, and the results have been since then embodied in my lectures, and have been printed for more than 23 years.† Very soon thereafter, Orfila also instituted a series of similar experiments, the results of which were completely in unison with mine. Most properly, therefore, now no one regards the occurrence of an ecchymosed mark on the neck as an unfailing proof, as a necessary criterion of death from strangulation—that is, of the strangulation having been committed during life. When we critically examine the observations of the earlier authors, it is easily seen that the error has chiefly arisen from the absence of a correct definition of the word *Ecchymosis.* Ecchymosis and extravasation convey, to a certain extent, precisely the same idea, and signify the escape of blood (usually more or less firmly coagulated) out of its vessels into the subcutaneous cellular tissue, and the interstices of the muscles. The existence of any such extravasation in any body can of course only be proved by the anatomist's knife, which at once brings to light the presence of any effused blood, whether it be only a few drops, or whether it be in larger quantity. A mere livid or violet coloration of that part of the skin beneath the ligature proves nothing, since post-mortem staining alone produces a very similar coloration, which may be rendered yet more deceptive by certain congestive conditions. There is, however, also a species of *pseudo-ecchymosis,* which is formed when, from pressure on the cutis, the return of the blood from the capillaries is prevented, and it is retained in them (by death). When such a patch of skin is incised, numerous bloody points are seen forming the mouths of the vessels in the cut surface of the skin, while not a trace of ecchymosis is to be found in the cellular substance beneath it. Now, not only was the actual condition of an ecchymosis formerly unknown, and every bluish or livid coloured stain termed an ecchymosis, but they also never thought of testing the nature of these stains by incising them, a mode of proof which, alas! is even now-a-days too often omitted: and thus the conviction arose that the "extravasated, livid, ecchymosed" mark of the ligature was an unfailing appearance. It is not possible to give any other explanation of this important error, which has been propagated for so long a time and through so many books, since no one is likely to assume that death from strangulation formerly displayed phenomena different from those we observe now-a-days! The following are the actual facts:—In almost every case, the trace of the strangulating ligature is to be observed on the neck (*Vide* § 38, p. 136, Vol. I.) as a mark, which, as a rule—that is, not always in those hanged, but always in those strangled—corresponds with the breadth of the ligature. The mark is sometimes one or two lines deep, sometimes so superficial as to be observable in some parts only on a narrow inspection. In those strangled, it passes right round the neck; in those hanged, this only occurs in those exceptional cases in which the fatal noose has been so drawn together by the weight of the body that the unfortunate victim has been more properly strangled than hanged. In most cases, however, this is not the case; but the back of the neck in those hanged is not crossed by the mark of the cord, which in them passes usually upwards behind the ears, and loses itself on the sides of the back part of the head. Other parts of the neck may also remain free of a mark, as, for instance, one entire side, which is probably caused by the head inclining, during the act of dying, more to the one side than the other, which is often the case. Indeed, a strong beard may so operate that no trace of any mark of a ligature is found on the neck at all, as is proved by the interesting Case No. CCLXXVI. In other cases the ligature does not produce an equable pressure all round, as when its texture is unequal, such as a soft kerchief with a hard border, or it is twisted two- or three-fold, depressing the skin deeply therefore in one spot, and less so or not at all on another, &c. So it happens that we find the mark of the cord on the neck, almost always more or less interrupted, as well as every possible variety of appearance in one and the selfsame mark. The following are the appearances usually found:—The mark of the cord may produce a dirty yellowish-brown colour throughout its whole course, cutting hard and leathery, and so resembling both in colour and consistence those patches of skin upon which mustard-plasters or fly-blisters have been applied shortly before death (the *mummified* mark of the cord); here and there also along its course, patches of excoriations are visible; hard and rough ligatures, such as hempen cords, most readily produce this form of mark, by excoriating the epidermis, and thus favouring the process of evaporation (drying-up). It is nothing uncommon, on incising the edges of such a mark, to observe the pseudo-ecchymosis just described; but true ecchymosis is just as seldom observed in this as it is in any of the other kinds of mark.—The mark of the ligature may also appear of a bright-blue or dirty-reddish colour, and is then soft to cut. Or, finally, it may have little or no colour at all, in which case it is also soft to cut. Very often, precisely in such cases, the edges of the marks are of a livid-red, and an erroneous interpretation of this has been given even by authors of repute, for these lividities,—and one may easily convince himself of this,—are only post-mortem stains, and have not the slightest pretensions to be even traces of ecchymoses. I repeat, that in very many cases one mark of the same cord, in its course may exhibit examples of all these three forms. Finally, a dark-coloured, blue, or livid mark of a ligature, following death by hanging or strangulation, which displays, on being *incised, blood extravasated into the cellular tissue,* is certainly *extremely rare, and occurs only exceptionally, if it occurs at all,* which, the longer I live and the oftener I have occasion to examine those hanged, I am the more inclined to doubt. Advanced putrefaction of course may render undistinguishable the mark of the cord, as well as every other cadaveric phenomenon.*

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* Institut. med. publ. adumbr., 1778, 4, s. 108.

† Wochenschrift, 1837, No. 1, &c. *Vide* also Casper's Denkwürdigkeiten zur med. Statistik und Staatsarzneikunde. Berlin, 1846, 8, s. 81, &c. In this treatise, the "Observations and Experiments on the Mark of the Ligature and on Death from Strangulation," are based, besides my own experiments on living rabbits and on dead men, only on the few isolated observations which I had then (thirty-four years ago) had occasion to make, and, for the most part, upon an extensive series of officially reported cases. In the text, however, I now speak *solely* from my own many years' experience in medico-legal examinations. This statement may suffice to explain any discrepancies which may appear to exist between the two treatises.

It has been frequently supposed that the various appearances of the mark of the cord depend upon the nature of the ligature employed, or upon its position on the neck in relation to the hyoid bone or larynx, and these various appearances have been explained by the fact that sometimes soft bodies (kerchiefs and the like), and sometimes hard ones (rope, &c.), have been used as the destructive agents; sometimes that the ligature has been above, upon, or beneath the larynx.

These various suppositions are not found to be confirmed by the results of observation. I myself have very often seen the same kind of mark produced by every different kind of ligature and every different position; and I have also seen every possible variety of mark produced by the same kind of ligature in the same position—and this both in those hanged while alive, and also in those merely hung up after death. The subject is of no practical value forensically, as the next section (§ 47) will show. On the other hand, it is a most important medico-legal matter to distinguish between *the mark of a ligature* intentionally applied to produce strangulation, *and the mere mark of the twisting of the umbilical cord round the neck* of new-born infants; it is not, however, difficult to do this on the body. We shall, however, return to this in § 111.

Finally, as to the traces of throttling on the throat, these precisely resemble in their nature the marks following hanging or strangulation, and differ only in their form. In such cases, the marks of fingers are found on both sides of the throat, either the mark of one finger on the one side, and one on the other, or more often one on one side and two on the other. Often, indeed, the impress of the thumb may be recognised in a mark larger than ordinary. These marks are round or semicircular, or perfectly irregular patches, often accompanied by scratches—that is, excoriations of the epidermis, made by the nails; they are usually dirty brownish-yellow, hard to cut, but not ecchymosed; but they are also, like the marks of the ligature, in rarer cases, of a dirty-bluish colour, and exceptionally (when death has not been instantaneous) they are actually ecchymosed.

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* *Vide* the representations of the mark of the cord, Plate V. Figs. 11, 12, 13; Plate X. Fig. 3.

§ 47. Continuation:—The Mark of the Cord.—Experiments on the Dead Body.

The diagnostic value of the mark of the cord is, however, very much impaired by the fact, which may be regarded as determined beyond contradiction by the results of the Parisian experiments and of my own, that *the mark of a cord* may be so produced *after death* as to be perfectly undistinguishable from one produced during life. In proof of this, the following experiments, made on the dead body, are appended:—

(1.) In April, 1855, I was enabled to experiment upon a man who had been scarcely *one quarter-of-an-hour* dead. A man, aged 45, had got into a public carriage to be taken to an hospital, and died on the way. The body was at once sent to the deadhouse, where, by chance, I happened to be, and after ascertaining the certainty of death by auscultating the heart, &c., a hempen cord, 2½ lines thick, was pulled with great force once round the neck of the quite warm body. On the third day the mark of the cord was inspected. It was quite exactly of a dirty brownish-yellow, soft to feel and to cut, scarcely one line deep, perfectly unecchymosed, and of course running, without a break, round the neck, though it seemed more distinctly developed on the left than on the right side (*Vide* the representation, Plate V., Fig 11). The countenance was pale and collapsed. A most unmistakeable turgescence of the penis was certainly a very remarkable accidental coincidence; from the urethral meatus depended a drop of mucus, which, however, was proved by the microscope not to be semen. In short, the external appearance of the body was precisely that of one strangled (while alive). On dissection the cause of death was found to be asphyxia, but produced by complete impermeability of the whole of the right and the half of the left lung, which were in a state of grey hepatization. The trachea was almost completely filled with white froth.

(2.) N. N., a man, aged 28, died of typhus at half-past ten on the forenoon of the 6th of August, 1827. *One hour* after death he was suspended in the cellar from a hook elevated six feet from the earth, by means of a double rope, placed above the larynx. Next day at 10 A.M. he was cut down and inspected by myself and two of my colleagues. The body had not yet commenced to putrefy; numerous post-mortem stains were visible on its posterior surface. Around the neck, between the larynx and the hyoid bone, there ran a double and parallel furrow three lines deep, which all round was coloured of so remarkable a bluish-brownish-yellow, that it struck us all on entering as we cast our eyes on the body lying on the table, for each of us, judging from the mark alone, would indubitably have taken it for the body of one hanged during life. On the right side, one inch from the mastoid process, there were several very deeply-coloured patches. The skin over the mark was harder to feel and to cut than the rest, and seemed positively leathery; in several spots it was slightly excoriated. No blood escaped on incising the mark, and none was found extravasated beneath the skin. But both the skin and the muscles beneath the mark seemed of a darker colour than usual, this being evidently only post-mortem staining.

(3.) On the 21st of September, 1827, a young man, aged 23, died from tuberculosis of the lungs. *One hour* after death had unmistakeably taken place, an experimental hanging was made similar to that in the second case just related, and on the forenoon of the following day the body was inspected. Round about the neck above the larynx a double furrow was visible, caused by a double rope, the twists of it being distinctly recognisable. This mark was of a yellowish-brown appearance, and felt and cut like parchment. Beneath the cutis we found neither effusion of blood nor any remarkable coloration of the muscles, but the whole of the cutis was as if burned, and was browned throughout its texture. The jugular vein, which was not remarkably visible externally, was, nevertheless, found to be much congested.

(4.) A very drunken man, aged 27, died of dropsy. *Two hours* after death an experimental hanging was instituted. The result was precisely similar to that in the third case just related, only that the yellowish-brown furrow was more visible on both sides near to the mastoid processes, than in the front of the neck above the larynx, where the rope had lain.

(5.) In a woman, aged 32, drowned on the evening of New-year's day, 1856, who had lain but a few hours in the water, a hempen rope was tied very firmly round her neck *twelve hours* after her death, and after cadaveric stiffening had commenced, and allowed to remain twenty-four hours. Ten hours after removal of the cord, we examined its mark. It was extremely distinct, two lines deep and just about as broad, that is quite agreeing with the size of the rope employed, running right round the neck, of a dirty-brown colour, particularly on the left side and back of the neck, soft to feel and to cut, and quite undistinguishable from a mark of the same kind, such as very many are, produced by hanging during life. This experiment was all the more instructive, as we had accidentally an opportunity of comparing its results with the appearances on the body of a suicide, aged 70 years, who had hanged himself apparently from pressing hunger, and who lay alongside of the body experimented on in our public deadhouse (*Morgue*). In fact, in the body of this emaciated old man, who had died from neuroparalysis, we found the stomach contracted to the size of the colon, and the mark of the cord was in him *much less remarkable* than that artificially produced on the body beside him, and of this all the by-standers were fully convinced!

(6.) On the afternoon of the 17th of August, 1827, a man died of nervous apoplexy. *Thirteen hours* after death he was strangled as firmly as possible by means of a cord placed above the larynx, which was removed after six hours. I found a soft mark, easily removed by pressure, without any discoloration or other alteration of the skin.

(7.) On the same day, a woman died of *carcinoma uteri; six hours* after death, a double rope was tied as firmly as possible round the neck beneath the larynx. Next morning it was removed, and about one o'clock I inspected the body, but found nothing, so that I could scarcely ascertain where the cord had lain.

(8.) *Four-and-twenty hours* after the death of a man from phthisis, a doubled rope was tied firmly round the neck directly over the larynx, so that the knot lay in front. Next day, 18th of August, 1827, I removed the rope and found a double mark of trifling depth, in which the twistings of the cord could be distinctly seen, but neither discoloration nor any hardness of the skin, nor was there any one patch more remarkable than another. On incising this depression there was nothing found worth relating, precisely as in Cases 6 and 7.

(9.) The same day and hour a man died from abdominal dropsy. *Four-and-twenty hours* after death a rope was also tied round his neck above the larynx, and the body as it were strangled. On investigation we could scarcely discover where the ligature had lain.

(10.) A girl, one year-and-a-half old, died on the 25th August, 1827. The following day a piece of thin packthread was firmly tied round the neck about the middle of the larynx. *Four-and-twenty hours* after, on untying the ligature, there was found running all round the neck a quite narrow blue stripe, without depression, but visible enough to strike one at once. On incision, however, there was no trace of extravasated blood found.

In all the cases just related the bodies, when they were not strangled, were simply suspended and allowed the full influence of their own weight. The mark of the cord is, however, developed in a far more remarkable, indeed quite a startling degree, when, after the body is suspended, it is powerfully depressed, and the noose thus drawn tight; this may be best effected by pressure on the shoulders of the body already hanging, or by pulling strongly at its feet. In this case suspension for only *a few minutes* is all that is required, *even when the body has been dead for days*, to produce a deep, uniform, dirty-brownish-yellow, more or less parchment-like mark. From the numerous experiments of this character, which are still carried on, I give the following as examples:—

(11.) At a temperature of + 12° to 15° R. = 59° to 65°.75 F., the abdominal coverings of a much emaciated insane man, aged 46, who had died paralytic, were already green, *sixty hours* after death. Just at this time the body was suspended from a door-post and forcibly drawn down, as we have just described. Two hours afterwards it was cut down. The mark of the cord was extremely remarkable, of a uniform breadth with the cord employed, 2 lines broad, 1 line deep, dirty-yellow, and mummified.

(12.) The body of a girl, aged nine years, who had died of phthisis, was treated in exactly the same manner *forty-eight hours* after death; after three hours' suspension the body was examined. The mark of the cord was very distinct, though much interrupted, both right and left; 2 lines broad, one line and a-quarter deep, yellowish-brown and mummified.

(13.) A much emaciated woman, aged 22, who had died of tuberculosis of the lungs, whose abdomen was already green the *second day* after her death, was suspended as described. After *one-quarter-of-an-hour* she was cut down and immediately examined. The mark of the cord was one line and a-half broad, two lines deep, running quite round the neck without a break, dirty-yellow, but soft to cut.

(14.) I beg to direct attention to the following case as peculiarly remarkable. An old and much emaciated woman of 70 years of age, who had died of an internal complaint *three days* previously, and had a very lean neck, and also a green abdomen, was suspended and pulled forcibly downwards. The body accidentally had to be cut down *five minutes afterwards,* and we were not a little astonished to find already formed a mark, one line deep, running uninterruptedly round the neck, which was of a dirty-yellow colour but still soft. Hundreds of times the mark of the cord in those hanged while alive is not nearly so well developed, as in all those experimentally suspended after death in the way described, experiments which any one can repeat for himself, and which are certain to be thus confirmed.

From these experiments it appears: THAT ANY LIGATURE WITH WHICH ANY BODY MAY BE SUSPENDED OR STRANGLED, NOT ONLY WITHIN A FEW HOURS, BUT EVEN DAYS AFTER DEATH, especially if the body be forcibly pulled downwards, MAY PRODUCE A MARK PRECISELY SIMILAR TO THAT WHICH IS OBSERVED IN MOST OF THOSE HANGED WHILE ALIVE. Indeed I confess to being convinced by the results of these experiments, that *the mark of the cord is a purely cadaveric phenomenon,* whereby, of course, its diagnostic value is reduced to nil. I am justified in this conclusion not only by the results of these experiments, but also by the fact that death in the case either of hanging or strangling is so sudden that the production of a mark of the cord in any of its peculiar forms can only take place *after death.* Our apparently rash assertion is further supported by the observation of what occurs in the case of those cut down early enough to be saved. In most of such cases examined by us we have not found, on the most careful examination of the neck, anything anormal; sometimes, however, we have seen isolated blue stripes, which (in those saved alive) looked liked ecchymoses, but could not of course be proved by the knife. Mummification of the mark of the cord, which is of such frequent occurrence, can, moreover, never occur during life, since it is a result of the process of evaporation from the body, and must therefore be a post-mortem phenomenon. In this respect, accordingly, the mark of the cord may be compared with the maceration of the hands and feet in bodies taken out of the water, which I shall by-and-by (§ 54) show is and must be a purely cadaveric phenomenon, though it has so long been reckoned as a proof of death from drowning.

The great practical importance of investigations respecting the nature of the mark of the cord is proved by those not uncommon cases in which murderers suspend or strangle their victims shortly after killing them in some other way, and the question arises, whether the hanging has taken place during life? (*Vide* Cases LXXII., CCLXVII., CCLXXXII., CCLXXXIII.)

§ 48. CONTINUATION:—THE LOCAL APPEARANCES ON THE NECK. —THE MUSCLES.—THE HYOID BONE.—THE LARYNX.—THE CERVICAL VERTEBRÆ.—THE CAROTID ARTERIES.

I comprehend under one head all those local appearances on the neck (7—11) besides the mark of the cord, which require to be considered: *rupture of the muscles*, the sterno-cleido-mastoideus, the sterno-thyroideus and hyothyroideus, the sterno-hyoideus and the pharynx; *dislocation* and *fracture* of the *hyoid bone*, *fracture* of the *laryngeal cartilages*, *rupture* of the *cervical ligaments*, and *dislocation* and *fractures* of the *cervical vertebræ*. When observers like Morgagni, Valsalva, Bohn, Krombholz, Mildner, to say nothing of Orfila, who is not always to be trusted, and Remer, who has only made use of the histories of dissections related by others, which he himself states to be "not always accurate," have stated that they have observed such consequences as the result of hanging or strangulation, the truth of the statement cannot be called in question. But it is also well known to experts that such injuries are extremely rare, and that each one of them is so exceptional as only to occur under quite peculiar circumstances.* And it is thus explicable that I myself have never once had occasion to observe any of the injuries included under this head in the bodies of those strangled. Therefore, should any of these appearances be found with evident traces of vital reaction in any given case, it must of necessity be regarded as an exquisite and acceptable proof of the strangulation having taken place during life, and this all the more that my often-repeated experiments on the dead body (§ 6, Spec. Div. p. 244, Vol. I.) have proved—particularly in regard to fractures of the larynx and hyoid bone—that the utmost violence applied after death is in general unable to produce such injuries.

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* For instance, at executions where the executioner, by pressing on the shoulders of the delinquent, adds his own weight to his; or, in the case of a sailor falling from a ship and getting caught round the neck and hanged by a loop of rope. (Archives gen. de médic., April, 1857, p. 479, &c.)

But for the reasons stated, the absence of any of these injuries must not be regarded as of the slightest value in rebutting the supposition of death being the result of strangulation.

(12.) In 1828, Amussat first observed *a laceration of the internal and middle coats of the carotid arteries* in the body of a man hanged "with cords," and brought it forward as a proof of strangulation during life. Quite recently this question has come to be discussed with considerable vivacity in the scientific world, and to be tested by experiments on the dead body; and the discrepancies in opinion have given occasion to renewed observation upon my part of all the bodies of those hanged while alive, and to very numerous experiments on dead bodies, which were all instituted with the less prejudice and the greater interest that the conviction of the utter worthlessness of the mark of the cord as a diagnostic test must direct attention to every novelty that may possibly prove to be such. The observations of others are as follow :—

DEVERGIE (*op. cit.*) has, in thirteen bodies of those hanged, once observed a laceration of the left carotid artery, which he has not more minutely described.

MILDNER,* in a very corpulent man, aged 48, who had been hanged with a hempen rope the thickness of one's little finger, found the internal coat of the left carotid torn across in two spots corresponding to the lower border of the rope. The upper tear was three lines, and the lower one two lines, in length. They were half-an-inch distant from each other, and parallel. The edges of the wounds were somewhat elevated, but not everted and coloured of a bright-red from imbibition. The base of the wound was formed by the cellular membrane, which, for about the size of a bean was livid, distinctly covered with a thin layer of extravasated blood, injected and infiltrated with bloody serum. The "small amount of elasticity possessed by the carotid, and the ease with which it was torn," were very remarkable in this case.

SIMON,† in six persons hanged, found this laceration twice. In both cases, mention is only made of "a trifling separation of the inner coat," and of "a very slight laceration of the most interior one," and nothing is said of any traces of reaction. Simon quotes from Faber, who had seen this laceration twice, and from Klotz, who had seen it once.

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* Prager Vierteljahrsschrift, 1850, 3, s. 157.

† Virchow's Archiv, 1857, xi. 4, s. 297, &c.

Kussmaul* states that his father had found this laceration three times in persons hanged, and he himself once. Both of these observers enter very minutely into the subject, and describe their experiments in hanging bodies, for which I must refer to the original paper.

In this category we must also reckon a case detailed by Wallmann,† of a fatal kick in the groin from a horse, in which there was found, in the right crural artery, below Poupart's ligament, a zonular transverse laceration of the internal and middle coats, 0.43 of an inch in length. In relating this, W. remarks that he had never observed any such laceration of the carotid in any case of suicidal hanging; amongst others, not even in the cases of "two emaciated individuals with long thin necks," who had made use of a narrow cord which had left "a very deep mark," in the one case above, and in the other below, the larynx.

The three last-mentioned observers, and also Malle, have instituted experiments on the dead body. Malle was able to produce laceration of the carotid only twice out of eighty-two bodies, some of them suspended, and others strangled, after death. Simon effected it in one out of three bodies suspended, and in three out of six bodies strangled after death. On the other hand, Wallmann, assisted by Prof. Engel, was wholly unable to produce this laceration even in one single case, although the experiments were made in every possible manner, and even with the use of wire as the strangulating medium.

As to my own personal observations, I have only twice observed rupture of the coats of the carotid artery among all those very numerous cases of hanging which have come before me, hanging being, as is well known, one of the commonest forms of suicide.

(1.) The still perfectly fresh body of the joiner H., was examined on the third day after death. It was found suspended from *a lofty branch of a tree* in the Thiergarten. There was well-marked *cutis anserina.* Spermatozoa in the urethral fluid. The mark of the cord ran right round over the larynx; on the right side it was faintly marked by a dusky coloration, but on the left side, and on the back of the neck there was a distinct streak here and there, of a blood-red colour, but perfectly unecchymosed. The cord, which was more than two lines thick, had evidently produced considerable constriction. Moreover, the body was very heavy, so that all the conditions necessary to produce rupture were here present, since the man, while dying and hanging in the tree, had indubitably been exposed to many tossings to and fro. And in fact there was a double rupture both of the inner and middle coat of the left (but not of the right) carotid artery. The upper laceration was one line, the lower one one line and a-half long; they were two lines and a-half distant from each other, and parallel. The superior laceration was surrounded by a livid border, one line broad, and appeared faintly ecchymosed; its edges were neither swollen nor everted. The inferior laceration was less remarkable, and in particular had not the appearance of ecchymosis (or sanguineous imbibition). Both carotids were very atheromatous. *There was nothing found amiss with the cervical vertebræ* (which in this case would not have been wonderful). The jugular veins were distended. The cause of death was asphyxia by congestion of the pulmonary artery.

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* Virchow's Archiv, 1858, xiii. I. s. 60, &c.

† Œsterr. Zeitschr. für pract. Heilk. 1858, Nos. 6 and 7.

(2.) On the 25th of March, R., a journeyman mason, aged 30, hanged himself in his dwelling, but was speedily cut down (dead), and his left jugular vein opened, venesection in the arm being also made. Next day his body was brought before us. I scarcely ever remember seeing so faint a mark of the cord. His face was pale, his eyes shut, his tongue behind his teeth. On the neck there were post-mortem stains. Round about the whole of his tolerably fat and short neck, there was found, on closer inspection, a broad, very slightly depressed, whitish and soft streak, which on the right side of the neck was *slightly* more visible than on the left, or on the back of the neck. The ligature had passed between the hyoid bone and the larynx. In moving the body much dark fluid blood escaped from the open jugular vein. The carotids were laid bare, and opened as they lay in the neck. They still contained a little blood. On the anterior wall of the right carotid, just below the point of division, and right beneath the mark of the cord, there was a very minute laceration of its internal coat, one line and a-half long, coloured faintly by imbibition. No trace of swelling, or eversion of the edges, &c., could be recognised, even with a magnifying glass, and the laceration appeared precisely as if artificially made in the dead body (see below). The left carotid, equally carefully dissected, displayed no trace of laceration. Both carotids were, however, visibly atheromatous. The laceration was particularly remarkable in this case, because the ligature had in it produced such an unusually trifling constriction. Death had ensued from asphyxia. The trachea was of a cinnabar-red, covered with white froth; the right side of the heart was turgid with dark watery blood, as were also the large thoracic vessels and the vena cava ascendens; the lungs and kidneys were both hyperæmic. There were no spermatozoa in the urethra. In no other case of death by hanging have I as yet seen any laceration of the carotids, notwithstanding the utmost variety both in the condition of the body and the nature of the ligature employed.

(3.) The following case gave rise to a series of experiments on the dead body, which have been continuously repeated ever since, and have now become so very numerous that I must content myself with only relating a few of those which seem particularly instructive. A robust coachman, aged 33, and 5 feet 4 inches in height, had hanged himself. Next day we found the mark of the cord between the larynx and the hyoid bone; it was broad and flat, dirty, soft, and more distinct on the *left* side than the right. The *right* carotid was seized in the usual manner with the forceps, and about two inches of it dissected out as far up as above its division. It was very atheromatous; and beneath the mark of the ligature there was found a jagged laceration of its internal coat, two lines and a-half long, the edges of which were faintly bloody from imbibition. From circumstances, however, it was suspected that this might have been *artificially* produced by *the pinching of the forceps.* The outside of the artery was therefore again pinched with the forceps, and *immediately there were found at the respective points two lacerations precisely similar to the one described,* which also became in a few minutes bloody, from imbibing the blood still adhering to the outside of the vessel. As counter-proof, the *left carotid* was so dissected out that the forceps were only applied at its lower incision; this portion displayed no appearance of rupture. It was then three times pinched with the forceps, and three lacerations were again at once produced.

(4.) Journeyman N., aged 46, died of tuberculosis of the lungs. *Two hours* after death, the body still warm and much emaciated, even about the neck, was suspended by a slender hempen bed-lace, only ¾ of a line in breadth, and repeatedly pulled downwards by the feet with violence. Two days subsequently we examined the body. The mark of the cord was ¾ of a line in breadth, of a dirty yellowish-brown colour, and the consistence of parchment (unecchymosed), and distinctly marked; it ran, close above the larynx, without interruption, as far as the mastoid process. We dissected out very carefully, and without using the forceps, 2½ inches of the right carotid from the region of the mark of the cord, and we found it perfectly uninjured. The arterial tube was then pinched with the forceps three times one after the other, and three ruptures of the internal coat were instantly formed, with tolerably smooth edges, which, even after a considerable time, did not become bloody from imbibition in this perfectly anæmic subject. The left carotid was then seized with the forceps in the usual manner, and a similar extent of it dissected out, and beneath *the point seized* a laceration two lines broad was again discovered.

(5.) In a man, aged 35, who had shot himself, and had been next day violently strangled with a hempen rope about two lines broad, both carotids were carefully laid bare beneath the mark of the cord, and opened without the use of the forceps. Both were quite uninjured. Moderate pressure with the forceps easily produced in each vessel three smooth-edged lacerations, which, in the case of this man, who had died from hæmorrhage, and in whom the blood was not so fluid as in those hanged during life, only became bloody from imbibition after the lapse of twelve hours. A piece of the brachial artery was removed from the middle of the right arm, and, treated in the same manner, gave similar results.

(6.) The subject of this experiment was a girl, aged nine years, who had died of an internal disease, and whose small and emaciated body was, forty-eight hours after death, suspended from a doorpost by a rope two lines broad, its feet pulled violently downwards, and the body cut down after three hours. The right carotid was now dissected out with the fingers, there was on it only a faint mark of the cord, and no laceration in it. The forceps were employed in dissecting out the left carotid, and yet in it also we had only a faint impression and no laceration, and it required very forcible pressure indeed with the forceps to produce a rupture of the internal coat in this case. The soft and healthy condition of the *juvenile* carotid explains the difficulty found in producing the rupture in this case.

(7 and 8.) The foregoing observation was again repeated in both of these instances, a girl, aged 7½ years, strangled by her mother, who afterwards hanged herself. In the child a comparatively forcible compression with the forceps was required to produce rup-

ture of both the internal coats of the carotid. In the mother, who was hanged, we again found no injury of the carotid, and yet it was once more found to be easily produced artificially.

(9.) A piece of the crural artery of a man, aged 56, who had been four days dead, was only gently pinched with the forceps, and yet a perfectly unusual laceration, a whole line in breadth, of both internal coats ensued. We have since then performed similar experiments on almost every body which has come before us, and constantly, without one exception, with similar results; and of this anyone can readily satisfy himself, the experiment is so easily performed. But, as Mildner has already correctly pointed out, even the pressure of the dissecting forceps is not required; a moderate, unintentional pressure with the fingers, that is with the nails, is quite sufficient to produce this rupture, particularly in those atheromatous carotids, which are so common in persons from 35—40 years of age: so easy is it *artificially* to produce an appearance of this nature, which *may readily deceive*, when, as usual, the edges of the laceration become *soaked with blood.* The following are only a few examples:—

(10.) In the case of a man who died insane, and was subsequently hanged; with strong pressure on the shoulders, and violent pulling downwards, a laceration was found on the right carotid, half-an-inch beneath the unusually low mark of the cord, although it had been dissected out without the use of the forceps. We suspected that this might have been caused by our finger nails, and this was at once confirmed by experiment upon the left carotid, which, while *in situ* was uninjured, but when removed and compressed by the same fingers, displayed precisely similar lacerations, which also very speedily became red by the imbibition of blood.

(11.) A tradesman, aged 38, had shot himself through the mouth. Both carotids, very atheromatous, were carefully dissected out with the fingers; in the left one there was found a small triangular laceration of the internal coat alone.

(12.) N., a weaver, aged 36, had hanged himself five days previously in the open air in September (the temperature being + 12° to 15° R. = 59° to 65°.75 F.). At the time of examination the whole body was already green. The mark of the cord, which had been a running noose, ran right round the neck. Both carotids were dissected out without forceps. The vessels were already purple-coloured from putrefaction and wholly uninjured. Compression with the nails on the portions of the carotid arteries removed from the body, produced, with the greatest care, just as many ruptures of both coats as there were impressions made.

(13.) The following case also deserves to be related as something peculiar. A man, aged 36, had, one evening, made *an attempt to hang himself*, but was cut down; he died, however, *several hours* subsequently. The mark of the cord was in this case very interesting. On the left side of the neck it was quite flat, but of a distinct livid colour. In the subcutaneous cellular tissue there was, however, *no trace of any ecchymosis.* The carotid was dissected out beneath this mark. It was atheromatous, but uninjured. Two pinches with the forceps produced with the greatest ease two corresponding lacerations. On the right side, where the mark of the cord was quite uninterruptedly visible, but without any visible depression, the forceps were used in the customary manner during the dissection, and were twice applied, and we found once more beneath both spots a smooth-edged laceration of both of the internal coats of the carotid artery. Similar lacerations were also easily produced in both of these arteries by the pressure of the nails.

(14 and 15.) In both of these cases we were able experimentally to produce *rupture of the carotids in dead bodies.* An emaciated woman, 71 years old, was suspended, two days after death, in the noose of a rope two lines and a-half broad, and violently pulled downwards by the feet. She hung for only five minutes, and yet her skinny neck displayed a very deep yellowish-brown mark round about it. The right carotid was laid bare, opened *in situ* and examined: in it there was a *jagged* laceration of the internal coat alone, two lines long, its edges were not swollen, but became bloody from imbibition after the vessel had lain a quarter of an hour. The left carotid, examined in the same manner, was found to be uninjured. Another very lean woman, aged 22, was treated in the manner just described on the day following her death. After hanging for two hours, the mark of the cord was not so well developed as in the previous case. The left carotid was laid open *in situ,* and was found to be atheromatous, but uninjured. A portion of it cut out and pinched by the forceps or finger nails, immediately exhibited lacerations of one or both of the inner coats, according to the amount of pressure. The right carotid, also atheromatous, *opened in situ,* displayed on its anterior wall a laceration one line and a-half long, again quite jagged, and again only of the internal coat.

According to all that is known regarding this phenomenon, we may lay down the following propositions: (1.) In very rare cases rupture of the internal coats of the carotids is found in those hanged (or strangled). (2.) From the very rarity of this occurrence it follows that its absence is not of the slightest value as evidence against the supposition of death from hanging. (3.) Rupture of the innermost, or of both the internal coats, may even be produced after death by hanging up the body. (4.) The existence of positive signs of vital reaction, swelling of the edges of the lacerations or actual ecchymosis, can alone prove that the body in question has died from hanging. Mere bloody imbibition of the edges of the wound does not prove this. (5.) The rupture of one or both of the internal coats may also be unintentionally artificially produced in the course of dissection, and may thus very readily give rise to a diagnostic deception. (6.) The causes of the occurrence of this rupture in those who have died from hanging *seem* to be: tight compression of the neck by the cord, leanness of the neck, and especially a peculiar brittleness or atheromatous condition of the carotids.

§ 49. CONTINUATION:—(*c*) THE INTERNAL APPEARANCES.

After what has been already said in § 44 regarding the nature of the death in strangulation, and after the description of the various appearances found after death by suffocation, we can afford to be brief here. When death occurs from apoplexy, of course we find general hyperæmia of the cranial cavity (not, however, actual hæmorrhage, this, even in the case of old men, being one of the rarest occurrences), and this, not only in the meninges but also in the brain itself and in the sinuses, presupposed, as always, that the blood has not been already decomposed by putrefaction and evaporated. Such cases, however, very frequently occur after death from hanging (as after suffocation), from the very nature of the thing, since suicides often go into a wood or to some retired spot to hang themselves, and their bodies often remain undiscovered for weeks or months. If death has occurred from suffocation, we find hyperæmia of all the thoracic organs, or specially in the lungs, or in the right side of the heart, and the blood darker and more fluid than usual. Red vascular injection of the mucous membrane of the trachea is of just as constant occurrence in these cases as after any other form of congestive death from suffocation; on the other hand, any considerable filling of the trachea with bloody or frothy mucus is much more commonly absent in such cases than after suffocation in irrespirable media. But the hyperæmic congestion of the vascular organs and venous trunks of the abdomen (§ 41) is never wanting in cases of death from this cause. But far more frequently than is generally supposed, as I must again repeat, far more frequently than hyperæmiæ of the head or chest, or of both together, the appearances found in those strangled are of that perfectly negative character which betoken death from neuroparalysis, in which not one single organ in the whole body displays any unusual alteration. And when, in isolated cases, circumstances arise which render it not improbable that death has occurred from apoplexy or suffocation, from some other cause, and that the deceased has been strangled subsequent to death, the decision of the question may prove extremely difficult, even when not disposed to be over-sceptical, or to permit ourselves to be blinded by bare possibilities. For when the circumstances actually favour such a supposition, and the dissection leaves the medical jurist in the lurch in regard to positive proof, the decision of the case may be an extremely difficult matter. If, finally, in such cases the very local evidences on the neck be wanting, as is so often the case, or if they be undistinguishable from those produced after death (§§ 47, 48), then the very best of us may at once openly confess that there is no possibility of deciding whether death has taken place from strangulation or otherwise, unless indeed the combination of all the circumstances attendant on the death be able to afford a basis on which to ground an opinion. Cases of this kind are far from being uncommon; are specially apt to occur in the case of new-born children, which, born in a cold apartment, have died shortly after birth from neuroparalysis (or apoplexy), without any actual criminal intent on the part of the mother, and which have then had a string tied round their necks to prevent their apprehended return to life. In another very difficult case, a new-born child was found in a full water-barrel, with an apron wound round it and strangled with its string. The question to be decided was, whether, as the mother stated, the child had died from natural causes shortly after its birth, and had been accidentally strangled after death, when the body was flung aside rolled up in the apron, or whether the child had died from suffocation or strangulation?

§ 50.—ILLUSTRATIVE CASES.

CASE CCLXIV.—SUICIDE BY HANGING.—HYPERÆMIA OF THE BRAIN.

An old woman of 70, still very vigorous and extremely fat, had hanged herself during the night. The physician who was called in had some scruples in signing the certificate of the death, and a medico-legal examination was thereby rendered necessary, and this revealed the cause of death to be apoplectic congestion, particularly of all the sinuses; the lungs were pale and bloodless, as was also the right side of the heart, the left was quite empty, the large venous trunks contained very little blood, the trachea was pale and empty. The entire head was, however, livid; the lips strongly ecchymosed, and the somewhat swollen tongue lay above the teeth. The mark made by the cord exhibited a depression running right round the neck, a proof that the woman had hanged herself in a running noose. On the right side of the neck the mark of the cord was livid for the space of one inch, very faintly livid and soft to cut; on the other hand, on the back of the neck it was of the extraordinary breadth of ⅜ of an inch, and, as usual, mummified, yellowish-brown in colour, cutting like parchment, and unecchymosed. This case affords an interesting proof of the correctness of our statement, that the difference in the nature of the mark is perfectly independent of the nature of the cord, since we have here in the same individual, consequently produced by the same ligature, a mark partly soft and livid, and partly mummified.

CASE CCLXV.—SUICIDAL HANGING.—APOPLEXY.

A man aged 36; seven days dead in February. The cord lay right over the larynx; its mark is scarcely depressed, only visible on the right side from the larynx to the ear, dirty greyish-blue, 3 lines broad, soft to cut, and unecchymosed. Distinct cutis anserina on both thighs. The point of the tongue lay upon the teeth. The countenance was pale, the eyes sunk. The trachea was pale and empty; the lungs only normally congested. The right side of the art contained certainly more blood than usual, which was not markably fluid, and the left side of the heart was also tolerably full of blood. The hyperæmia within the cranium was distinctly marked and recognisable as the cause of death.

CASE CCLXVI.—SUICIDAL HANGING.—DEATH FROM SUFFOCATION.

In the body of this unknown man, aged about 40, the tongue lay behind the teeth, the fæces had escaped, and spermatozoa were found in the mucous fluid of the urethra. The mark of the cord ran over the larynx towards the mastoid process, was dirty yellow, three lines broad, soft, and unecchymosed. The brain was only moderately full of blood; the mucous membrane of the whole of the trachea injected of a cinnabar-red; both carotids uninjured beneath the mark of the cord; the right side of the heart distended with dark treacly blood, the left almost empty, but the large vessels distended. The vena cava contained much blood, without being hyperæmic; there was nothing else remarkable in the abdomen. The discovery of the mark of circumcision, and soft clean hands, justified the opinion that the deceased had probably been born a Jew, and had undergone no hard work during his lifetime.

CASE CCLXVII.—SUICIDAL HANGING.—SUFFOCATION.

A man, aged 60, had hanged himself four days previously, in February. The body was quite fresh. The countenance was pale, the eyes deep sunken. The tongue was swollen, and lay a few lines beyond the teeth. The penis was five inches and a-half long, and seemed as if half erected. No spermatozoa were found. The mark of the cord was sometimes only half a line, and at others two lines in depth, ran right round the neck without interruption, and its two ends met together over the nape. Indubitably this man had hanged himself in a running noose. The mark lay immediately beneath the larynx; it was dirty brownish-yellow, and without a trace of ecchymosis. A white gelatinous effusion, one line thick, beneath the arachnoid, proved the man to have been a drunkard. The vascular meninges were hyperæmic; the plexuses, both the cerebrum and cerebellum, and all the sinuses, were not so. The left lung was much congested with dark fluid blood; the right less so; both were œdematous. The heart was very fatty, and its coronary veins much congested; its left side contained a tolerable amount of black treacly blood, with which its right side and all the large vessels were distended. The larynx and trachea were uninjured, and empty, but here and there of a cinnabar-red, from injection. There was no injury either of the cervical vertebræ or carotids. The spleen was double the usual size; the kidneys distinctly hypertrophied. Both contained much blood, but the vena cava was actually turgid.

CASE CCLXVIII.—SUICIDAL HANGING.—ASPHYXIA BY PULMONARY APOPLEXY.

In this man, aged 28, who had hanged himself in May, the cord lay between the larynx and the hyoid bone. Both conjunctivæ were much congested; the left side of the face reddened; both ears blue; and the livid tongue lay between the teeth. The organs of generation were normal; the inferior extremities soiled with excrement. The brown coloured, parchment-like, unecchymosed mark, was only to be seen and felt upon the right side of the neck. Its edges, on being incised, displayed small bloody points from congested dermoid veins. The dura mater was hyperæmic; the cerebral veins only moderately filled; the cerebral substance and the plexuses tolerably congested; the sinuses turgid. The larynx and trachea, which were already of dark cherry-red from putrefaction, were uninjured—their mucou membrane coated with mucus. The heart was large, its coronary veins tensely filled; the left auricle, and the whole of the right sid of the heart, very hyperæmic; the blood syrupy. Both lungs wer very dark, very hyperæmic, and full of froth.

CASE CCLXIX.—SUICIDE BY HANGING.—SUFFOCATION.

The deceased was 32 years old. His countenance pale. Th tongue lay behind the teeth. There was neither erection nor ejaculation, but escape of excrement. The brain exhibited scarce a trac of congestion. The hyperæmia in the lungs and right side of th heart was very well marked. The trachea was uninjured, and in i bloody froth lay upon the cinnabar-red injected mucous membrane The vena cava ascendens was stuffed like a sausage. In this case th intestines were unusually distinctly coloured of a dark rosy-red. I was somewhat remarkable to find a scarcely visible, perfectly colourless, soft (and quite unecchymosed) mark of the cord conjoined wit such appearances.

CASE CCLXX.—SUICIDAL HANGING.—WELL-MARKED CASE OF ASPHYXIA.

This case was particularly instructive, because it presented an example of the occurrence of the *petechial ecchymoses*, above described (§ 40, p. 126, Vol. II.), in an adult, a young man aged 18, who hanged himself in March, with a rope three lines thick, and whose body we examined two days after death (compare Case CCLXXXV). Well-marked *cutis anserina* on the thorax and thighs. The tongue was not swollen, but its point was fixed between the teeth. The countenance was pale, the eyes shut, and not protuberant. There was neither erection, nor ejaculation, nor fæcal escape. The mark of the cord was only visible for about 3½ inches from the middle of the throat, on the right side, losing itself beneath the right ear. It was of a true parchment-like appearance, dirty brownish-yellow, and exhibited no ecchymosis. The cranium contained the normal amount of blood. "The heart," it is stated in the protocol, "is completely sprinkled over with petechial ecchymoses, particularly at its basis. The internal surface of the pericardium is also covered with many similar ecchymoses." The blood was remarkably fluid. The right side of the heart was turgid, containing a few coagula floating in the watery blood; the left side contained but little blood. The large vascular trunks were distended. The larynx, trachea, and cervical vertebræ were uninjured. The trachea was covered with dendritic injections; and on making pressure on the lungs, much yellow froth rose into it. Both lungs were very hyperæmic; as were also the kidneys, the mesenteric veins, and the inferior vena cava.

CASE CCLXXI.—SUICIDAL HANGING.—DEATH FROM SUFFOCATION.

(*Vide the Representations, Plate V., Fig.* 12, *and Plate VIII., Fig.* 23.)

On the 10th of April, a powerful man, aged 32, said to have been banished from Berlin, hanged himself with the rope fastening the cover of a large covered waggon, such as is used for conveying furniture; and on the 12th we examined the body, still quite fresh. The countenance was collapsed, of a faint, dirty-bluish colour; the ears were very blue; the eyes closed, sunken, and not ecchymosed.

Very well-marked *cutis anserina* on all the extremities. The penis quite relaxed; the urethral meatus quite dry; neither urine nor any suspicious-looking stains upon the shirt, but there had been fæcal escape. The tongue lay behind the teeth. A collection of white froth upon the mouth permitted the assumption that the trachea was full of it; and this was found to be the case. The mucous membrane of the larynx and trachea were entirely of a cinnabar-red, and congested in an extreme degree, even to the extent of causing an actual patch of ecchymosis on the posterior wall of the trachea (Plate VIII., Fig. 23). The tracheal cavity was tolerably completely filled with a rosy-red froth, which is washed off from one side for the purpose of exhibiting the colour of the mucous membrane. I have also caused the mark of the cord in this case to be represented (Plate V., Fig. 12), because it shows in a very instructive manner how exactly such a mark produced during life may resemble one produced after death. The mark lay between the larynx and hyoid bone; on the left side of the neck it appeared as a very slightly depressed, dirty brownish-yellow, partly greyish-red impression, corresponding in breadth with the rope, soft to cut, and with no trace of ecchymosis. On the right side of the throat it was quite invisible, and first appeared about the mastoid process in the form of isolated whitish-coloured, and very superficially-depressed patches, coursing towards the nape of the neck, where they ceased to be visible. The only appearances found on dissection worthy of mention, were the hyperæmic condition of the bluish-grey, slate-coloured lungs, and the distention of the pulmonary artery with dark fluid blood, while the heart was almost completely empty of blood. The abdominal veins were also congested, but there was nothing remarkable found within the cranium, nor in any of the other organs.

CASE CCLXXII.—SUICIDE BY HANGING.—DEATH FROM NEURO-PARALYSIS.

A man, aged 50, had hanged himself in December, and the body came to us quite fresh. The tongue lay behind the teeth; the countenance was pale and collapsed; the eyes did not protrude. The mark of the cord ran over the larynx; its greatest breadth was half-an-inch; its course was interrupted; it felt somewhat firm; dirty brownish-red, soft to cut, and without a trace of ecchymosis; it vanished behind the ears. There was no injury of the muscles or vessels of the neck; no fracture of the larynx, nor of the cervical vertebræ. The vascular meninges were not more congested than usual; neither was the brain nor the sinuses. The lungs were, as usual, of a marbled slaty hue; the heart was flabby, its coronary vessels were not congested; its left side contained about half-an-ounce (imp.) of dark fluid blood, and the right about the same quantity; on the other hand, the pulmonary artery contained a large quantity of blood of the same character. The larynx and trachea were without a trace of vascular injection, and quite empty.

Case CCLXXIII.—Suicidal Hanging.—Neuroparalysis.

This young man, aged 18, died in January. The abdominal covering was already green. The tongue was behind the teeth, the countenance pale, the eyes deep sunken. The mark of the cord was four lines broad, of a dirty-grey colour with reddish edges, lay in front betwixt the hyoid bone and larynx, and extended to the cervical vertebræ, where there was a space two lines broad left between its extremities; it was scarcely depressed, soft to cut, and unecchymosed. The cervical vertebræ and the larynx were uninjured; the sexual organs exhibited (even in so young a man as this) *nothing* remarkable. The amount of blood within the cranium was quite normal. The *thymus gland* was two inches long. The lungs were of a dark blue slate-colour, and not hyperæmic. In the pericardium there was a tablespoonful of bloody fluid; the coronary veins were empty; in the left auricle there was a small amount of black blood of normal consistence, and the same in the right one; both ventricles were almost empty. The large vessels contained but little blood. The larynx and trachea were uninjured and empty; the mucous membrane displayed the brownish-red coloration of putrefaction. The only important appearance in the abdomen was the great congestion of the vena cava.

Case CCLXXIV.—Suicidal Hanging.—Neuroparalysis.

This man, aged 50, died in April. The abdomen was of a greenish colour from commencing putrefaction. The sexual organs were normal. On the anterior surface of all the extremities there was well-marked *cutis anserina.* The countenance was pale, the eyes deep sunken, the tongue behind the teeth. The cervical vertebræ were

[illegible]

[illegible]

[illegible] days after [illegible] over the whole body. [illegible] pale. Penis re-[illegible]. [illegible] no effusion [illegible]. On the right side of the [illegible] a perfectly white and soft [illegible] scarcely half a line deep. On the left side [illegible] an impression of similar breadth, two lines long, [illegible] parchment-like [illegible] and [illegible] The [illegible] No hyperæmia anywhere. All the organs were perfectly normal, so that the result of the dissection was perfectly negative.

Case CCLXXVI.—Suicidal Hanging.—No Mark of the Cord visible.

I append this case as an additional proof of the innumerable complications which come before the medical jurist. It is a case, well known to be suicidal, in which a man, aged 30, hanged himself, and died from pulmonary hyperæmia. The mark of the cord was in this case not visible, and could not have been expected to have been so, inasmuch as the deceased had a remarkably strong beard, and the cord had lain in this over the hyoid bone! After shaving off the beard, all that could be seen of the mark of the cord was merely a perfectly superficial mark on the right side of the neck, three lines broad, one inch and a-half long, and of a faint dirty colour. How easily might such a trifling mark have been overlooked in other cases, where there was no reason even for suspecting death by hanging! Two other accessory circumstances were also remarkable: the right hand of the body was macerated, as in those drowned. It *must* have been lying in some fluid; and this was found to have been the case, for the body after being cut down had by chance lain for two days with this hand in a pail of water. In like manner was confirmed the statement, that the body after being cut down had been laid upon its left side, since the left side of the chest and face exhibited well-marked hypostases, while the back was quite free from all post-mortem staining. The internal hypostases were also found in similar unusual positions. The cerebral hypostasis, not posteriorly, but over the left hemisphere, the pulmonary one, not below but at the left side of each lung, while the left kidney alone, exhibited any hypostatic engorgement.

I do not consider it necessary to give the details of any more of my numerous collection of cases of death by hanging, because the foregoing afford sufficiently numerous examples of the various forms in which this kind of death occurs, and because I shall also have occasion to relate several other cases in considering the question of doubtful suicide, or murder by strangulation.

§ 51. Homicide or Suicide?

The body of a man has been found, which at first sight appears to have been hanged, strangled, or throttled. The circumstances excite a suspicion of murder, and the medical jurist has the difficult task of deciding whether death has in this case been the result of homicide or suicide? Difficult, I say, because though in many cases the answer is very easily given, still it may be in many others quite unattainable. It is necessary first of all to determine according to the criteria just given, whether death has been actually the result of strangulation. Has the deceased not died from strangulation, but from some other cause, then, of course, it is perfectly certain that he has not hanged himself, but has been suspended after death; and such cases have been observed by others as well as ourselves. In such a case the question may be very easily decided. A sailor was instanintentionally killed by a stab in the heart in a nocturnal brawl in one of the lowest brothels of Amsterdam. In order to conceal the crime, the women of the house washed the body, put a clean shirt on it, and suspended it by the neck (Vrolik). No apparent symptom of death from hanging, but a penetrating wound of the heart. In such a case, what would become of the inquiry? It is just as easy to decide when a stillborn child has been strangled, partly because the mother has believed it to be alive and desired to kill it, and partly because she has regarded it as merely swooning, apparently dead, and thought it might again revive. The *docimasia pulmonum* will at once prove the child to have been born dead, which solves the doubt at once, because a corpse cannot be murdered.

How shall we act however when in the autopsy the appearances resulting from death by strangulation are actually found, those, namely, dependent on suffocation, apoplexy, or neuroparalysis? In such a case we cannot overlook the fact that these appearances are not peculiar to death from strangulation, but only occur as the results of other kinds of death. The man may have been, for example, suffocated in quite a different and even a criminal manner and only suspended after death. Devergie inquires, where would be the disadvantage of an erroneous diagnosis in such a case? since the medical jurist would always have determined the fact of death having been the result of suffocation. But Devergie has omitted to consider the frequent necessity there is in criminal matters of unravelling the various degrees of guilt attaching to the several parties implicated in the commission of the crime. Suppose A and B to have both been engaged in the perpetration of such a deed. A has suffocated the man, but B has only suspended the body. B is certainly punishable for his share in the transaction, but A alone is to be looked on as the actual murderer.

In cases of this sort, where the man has died from one of those kinds of death like [illegible] strangulation, and when he has been suspended soon after death, in which cases, as we have already shown, the mark on the neck of the body may precisely resemble that resulting from suspension during life, it may be perfectly impossible from the mere results of the dissection to answer the question: Has there been a case of homicide or suicide? But the medical jurist must in this case also, in accordance with the rules already so frequently laid down in the foregoing chapters, seek to obtain at least a probability from the consideration of all the circumstances attendant on the death.* We have already stated that universal experience teaches us that throttling almost certainly, and strangulation with the greatest probability, lead to the supposition of the homicidal character of the deed, while hanging affords the very highest probability of the deed being suicidal, since experience teaches us that hanging is that kind of death usually preferred by suicides. For instance, in the three years, 1852—1854 inclusive, we had 368 cases of suicide in Berlin, of which 189, or more than one-half, were by hanging. As part of this circumstantial evidence, we must reckon the ascertaining—where possible, when the bodies are not wholly unknown—the social condition in which the deceased has been living. Who was the man? Was he a drunkard, one imprisoned as suspected of some crime, one living in extreme misery, or labouring under some tedious and painful disease? In short, were the social conditions in which he lived such as, in accordance with general human experience, might have induced him voluntarily to put an end to his life? or were they the direct opposite? And can we not discover in those social relations the slightest motive for suicide? This proof from the combination of circumstances attendant on the death, I need scarcely say, can only give a certain amount of probability, and is chiefly of use to support other positive or negative evidence afforded by the case. But there is another still more important piece of circumstantial evidence, the fact, namely, that it is easy enough to throttle a man, not difficult to strangle him, but almost impossible to hang him, unless he be a child, unconscious from any cause, a fatuous simpleton, incapable of resistance, from decrepitude, or overpowered by his assailants, as when the deed has been done by several men in combination. In such cases, therefore, as in other cases of throttling or strangling, a precursory struggle is always to be supposed, and the body must therefore be carefully examined with the view of discovering the traces of the struggle, such as scratches, wounds, dislocations and fractures (particularly of the fingers), true ecchymoses arising from blows, knocks, kicks, &c., strange hair in the hand, &c. In this respect, however, I must again caution against an error, which is just as excusable, and likely to happen where experience in the observation of dead bodies is defective, as it is likely to involve the most important consequences. I mean the mistaking for marks produced during life, those often very numerous red, reddish-yellow, dirty brownish-red patches on the face, neck, chest, extremities, &c., which are so frequently observed on bodies coming to the medico-legal dissecting-table, and which are only the result of the rough usage to which the *corpse* has been exposed during its unclothing and removal, by which it has been knocked about, trailed along the ground, or otherwise maltreated and injured. That such marks, always more or less hard to cut, and never truly ecchymosed, can actually be formed after death, as our numerous and still continuously instituted experiments, prove beyond doubt, has been already fully detailed. (*Vide* Gen. Div. § 33, *sub* 2, p. 117, Vol. I.)

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* *Vid.* Spec. Div. §§ 9, 14, 23, 37, and 42, Vols. I. and II.

The *position and situation* in which the body was found when first discovered may also afford most important evidence.

The ancient dogma, that suicidal hanging is impossible with the body in a horizontal position, has been long since set aside. I shall relate further on two cases (CCLXXXV. and CCLXXXVI.) observed by myself, which most unmistakeably prove the contrary. It is equally erroneous to suppose that the case has not been one of suicide, if the body be found standing upon one or both feet. Further on, three cases (CCLXXXIX.—CCXCI.) of indubitable suicide are detailed, in which the bodies were found with both feet touching the ground.

The cases collected and very accurately portrayed by Marc* are extremely instructive and demonstrative; they were published on the occasion of the death of the *Prince de Condé*, after the revolution in July, 1830, to invalidate the doubts which had been thrown out against his having committed suicide. In one of the cases detailed, only the toes of both feet—as in the case of the prince—touched the ground, on which grain was scattered. In a second case, a prisoner hanged himself from the iron bar of his window, the body was sitting on the window-sill, the whole of the right foot was flat upon the floor, the left one touched it with its toes. Another prisoner, who had also hanged himself from the window, stood with the whole of the left foot upon the window-sill, while the heel of the right foot also touched it. In the case of an English prisoner, the body was found in a sitting posture, the nates only one foot and a-half from the floor, while the heels of both the outstretched legs touched it. Another very instructive position was displayed by the body of an artisan who had hanged himself in his (French) four-post bedstead; the body was found in a kneeling posture, the knees only eight or ten inches from the bed on which the toes of both feet rested. The seventh picture represents the body of a *puella publica*, who hanged herself in prison on a hook only four feet from the ground, lower therefore than her own height; she was found with both legs divergent, the right outstretched and resting with its heel upon the floor, the left bent somewhat backwards and also touching the floor with its toes. This case was also indubitably suicidal. The last of Marc's pictures also represents the body of another prostitute, which was found so suspended from a bed-post that the head and legs were diagonal to the floor, on which the whole of the left leg from the hip downwards, and the whole of the right foot, rested. I have also observed a case of murder, in which the person murdered was suspended in a lying posture, from the foot of a bed (Case CCLXXXI.). It is possible, and may be supposed, that in those cases in which the body has been found with its feet more or less touching the floor, this has not actually been the case at the moment of suspension, but that the weight of the body after death has stretched the ligature, or the cadaveric stiffening has stretched the body; the body has, however, been always found thus. Such cases have given occasion to the French to divide cases of hanging into complete and incomplete (*vendaison complète et incomplète*). Such a division is of no practical utility. It is sufficient to know that it may be regarded as determined that THERE IS NO POSITION OF THE BODY INCOMPATIBLE WITH SUICIDAL STRANGULATION, and in which it has not occurred, so that the body may be found hanging in the air with more or less of one or both feet on the ground, even to the extent of resting completely upon it, kneeling, in a complete or only a half-sitting posture, lying horizontally or obliquely, &c. Nevertheless, the position in which the body is found may in isolated cases positively prove the case to have been one of murder or suicide. Suicide—when, for instance, the body is found hanging high up in a tree; murder, when it is found suspended from a height with its hands tied behind its back, or in some remarkable position, as in Case CCLXXVII., in which the murderer or murderers obviously intended to mislead the prosecutor with the appearance of suicide, but had carried out their intention in rather a clumsy manner.

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* Annales d'Hygiène Publique, v. p. 156, &c.

Since, therefore, the general results of the dissection of one strangled cannot give any infallible evidence in favour of the case being one of homicide or of suicide, and in order to determine this, it is, in all doubtful cases, in the first place necessary to ascertain whether the deceased has been actually alive when strangled, and as this can only be done with certainty when appearances are found which belong exclusively to death from strangulation, such as turgescence or erection of the penis, with or without emission of semen, a true ecchymosis of the mark of the cord which, however, will never be found, or even marks of throttling upon the throat, rupture of the internal and middle coats of the carotid arteries with signs of vital reaction in the place of rupture, and laceration of the muscles of the neck. Fractures of the laryngeal cartilages and of the cervical vertebræ, accompanied with signs of vital reaction, do not, of course, belong to this category. Since, however, all these appearances are only very rarely and exceptionally found in the bodies of those strangled, as we have already pointed out, no use can be made of them in by far the greater number of cases. In these, therefore, that is, in those usually occurring in medico-legal practice, the only means of deciding the question whether death has occurred from strangulation, and whether this has been a homicidal or suicidal act, is, carefully to consider the sum of all the diagnostic evidence in connection with the circumstances attending the death; to individualize each separate case with all its peculiarities, and in the more difficult cases also to give an opinion so worded, as we have already frequently recommended, as that it shall, on the one hand, not be too comprehensive, so as to burden the medical conscience; nor, on the other, too nearly resemble, from excess of scepticism, a declaration of incompetence, or be any satisfaction to the Judge; as, for instance—we repeat it—to say, "that the results of the dissection, and the consideration of all the circumstances attending on the death of the deceased known to the medical inspectors, have not revealed anything inconsistent with the supposition that his death has been the result of suicide." From long experience, I can testify that such a formula is in general perfectly satisfactory to the Judge, for whose satisfaction alone, we must always remember, "judicial" dissections are performed; and this all the more that he very often has caused the examination to be made, not because there is any actual suspicion of the culpability of a third party, but because the peculiar position in which the body was found, or the existence of seeming injuries upon it, has excited this suspicion, whilst these circumstances give no occasion to the medical expert to entertain any such idea.

§ 52. ILLUSTRATIVE CASES.

CASE CCLXXVII.—HAS THE STRANGULATION BEEN HOMICIDAL OR SUICIDAL?

At 10 o'clock, on the morning of the 22nd April, 18—, the neighbours observed smoke issuing from the windows of the house in which an old woman of seventy-two dwelt alone. The door was found fastened; the window was therefore driven in, the shutters unfastened, and an entrance thus effected; the apartment was found full of smoke, the straw in the bedstead on fire, the key of the locked door wanting, and the body of the aged woman B. *sitting on a stool,* apparently strangled. Several paces from her seat there was a hook driven into the wall, round which was wound an old *linen cloth, twisted* to the thickness of one's little finger, and one end of which hung down. The presses in the room were found open, and out of them clothes and valuable effects had been taken. The body was laid upon the floor, and the physicians A. F. and K. made vain attempts at resuscitation. These physicians found "a depressed mark of strangulation, which ran from the sterno-cleido-mastoid of the right side to behind the same muscle on the left side. This was most strongly developed on the left side; and in one place, indeed, it was double. The countenance was blue." Dr. A., four days later, just previous to the inspection, declared "that the mark of the cord was no longer so distinct as it had been." A workman (H.), who had assisted at the attempt at resuscitation, declared "that there was a red stripe round the neck which had quite the appearance of a blow from a whip." On the 26th, four days after death, we dissected the body, which had still many bed feathers in its hair. The tongue, somewhat swollen, but pale, lay between the toothless gums. The hands and nails were of a bluish colour. On the left cheek there was a trifling scratch through the skin; on the nose and mouth trifling spots of dried blood; the lips were bluish; in the centre of the upper lip there was an ecchymosed patch the size of a pea. On the left side of the neck, from the posterior edge of the sterno-cleido-mastoid to the anterior border of the same muscle, on the right side, there ran a perfectly flat dirty brownish-yellow mark, half-an-inch in breadth; both its edges were here and there of a reddish colour, and it was depressed to the amount of a quarter of a line in isolated spots; towards its right end, this mark became gradually less visible. It was soft to cut, and nowhere exhibited any subcutaneous ecchymosis. It coursed right over the centre of the larynx. Half-an-inch above it there were a few traces of increased cuticular redness, probably originating in a second mark, which was now no longer visible. At the left angle of the lower jaw there were two bluish-red true ecchymoses, one the size of a pea and the other of a threepenny piece, and a precisely similar spot, the size of a sixpence, was found at the lower margin of the right jaw, about one inch and a-half from its angle. The most important of the appearances found internally were: evident congestion of the lungs, with dark, tolerably fluid blood; great congestion of the coronary vessels; little blood in the left side of the heart, while the right side of the heart and the large thoracic vessels were greatly distended; the whole of the tracheal mucous membrane was of a deep and brilliant red, and on it there were a few drops of watery blood; the fauces were of a dark-blue colour. Within the cranium there was a very considerable congestion of the veins of the dura and pia mater; on the inner surface of the epicraneal aponeurosis, just over the occipital protuberance, there was a circular extravasation of blood two inches and a-half in diameter; there was nothing else of importance. Finally, in the abdomen, there was very considerable congestion of the omenta and mesenteries; the kidneys contained an unusual amount of blood, and the venous trunks were turgid with dark fluid blood. From these appearances we could assume it to be certain that the deceased had died from asphyxia. And the violent cause of this suffocation was also unmistakeable, for, apart from the fact that there was no other apparent cause, since suffocation from the smoke of the straw, which was possible, would have made itself known by a different (sooty) colour of the tracheal mucous membrane; apart from the fact that, granted that the mark of the cord, which at the time of the legal inspection had an appearance precisely similar to what is observed in persons already dead when strangled—granted, I say, that, according to the descriptions of the physicians, who saw the body of B. at an earlier period, and that immediately after her death, this mark had then a different appearance,—still, in this case, the mark of the ligature is of but little importance, since the dissection has revealed another and a much more important phenomenon; we mean the true ecchymoses described as seen upon the throat, two on the left ide and one on the right side. These appearances can only be the sult of external pressure; and it is evident that they correspond to finger marks, the thumb being placed on the right side of the throat and two fingers on the left side.

Indubitably this throttling was the first attempt made on the life of the deceased, and the ligature was subsequently employed, and that no long time could have elapsed between the two is evident from the history of the events given in the documentary evidence.

The suspicion of suicide was easily set aside, although evidently the murderers had given themselves some trouble to excite this idea, as was proved by the cloth hanging from the hook on the wall. But this idea has certainly been seldom more clumsily carried out! The key of the locked door was wanting; there was no ligature round the neck of the body when discovered; and the murderers, in their hurry, had entirely forgotten that if B. had hanged herself from the hook in the wall, she could not have been found, as a corpse, sitting on a stool at some distance! Moreover, the fire-raising must indubitably be referred to a third party, who sought therewith to conceal the murder. The murderer—one or more—was never discovered.

CASE CCLXXVIII.—SUSPECTED CHILD-MURDER BY STRANGULATION.

The following was a most important case of accusation of child-murder. The servant-maid K. was supposed to have secretly given birth to a child on the 17th of January; she however denied this to the midwife sent to her, although a recent after-birth was found lying on the floor. Shortly afterwards the midwife discovered, lying beneath K. in the bed, the lifeless body of a child, still warm, covered with blood and dirt, and rolled in a new apron. The accused now confessed that the child was born on the floor, on which there was a quantity of blood. On the window-sill the midwife found a pair of bloody scissors, and near the bedstead three pieces, and fastened to the head of the bed a fourth piece of cotton cord, stained with blood. This cord, afterwards produced to us, was from 17 to 34 inches long, and from ½ to 3 lines thick; the two thick portions were almost completely soaked in blood, the two thin portions were scarcely stained at all. The accused subsequently made the following statements regarding her delivery:—About eleven o'clock at night she was seized with such violent pains that she threw herself on the floor and lost all consciousness. Afterwards regaining her senses, she went to bed and fell asleep, and next morning discovered, for the first time, a dead child lying on the floor where she herself had previously lain; this she now took and laid beneath her. In regard to the division of the umbilical cord, which was pointed out as contradicting her statement as to her loss of consciousness, she pretended not to know anything about it; and in like manner, at the close of the examination, she asserted her complete ignorance in regard to the bloody cord already mentioned. At the medico-legal dissection of the child, we found, in the first place, all the signs of maturity. "We found a scarcely visible mark, two lines broad, not in the least depressed, neither cutting nor feeling hard, and distinguished by its *whiteness* from the rest of the skin, running round the left side of the neck, over the nape, and then losing itself. No extravasation of blood was found on incising this mark." At present, I only quote the following as the more important appearances found upon dissection:—Congestion of the liver; urinary bladder empty; large intestines filled; the large abdominal veins tolerably congested with dark, treacly blood; the lungs red, marbled with blue, and completely filling the thoracic cavity; the lungs and heart weighed about 2 ounces and a-half (imp.) (without the heart, only about 1 ounce and 10 drachms) (imp.); the lungs floated perfectly, and emitted frothy blood and a sound of crepitation on being incised, and on squeezing these incised portions beneath the surface of the water, numerous air-bubbles were seen to ascend; the coronary vessels of the heart were moderately full; the right side of the heart was empty, and the left only moderately full; the larynx and trachea were empty, and of their natural colour; the skull-bones were visibly infiltrated with blood; the dura mater and the cerebral vessels much congested. These results, of course, led us to conclude:—That the child was mature; that it had lived subsequent to its birth; and that it had died of apoplexy. And we then went on to say:—"It is not so easy to give any certain opinion regarding the cause of this fatal apoplexy. The only appearances that could lead to the supposition of a violent death, were a few trifling excoriations of the cuticle on the right ear and parietal bone, which were quite unimportant, and the mark described as found upon the neck. The discovery of the bloody cotton cord, as well as the behaviour of the accused to the midwife, and her evidently-contradictory statements to the Judge, naturally give rise to the suspicion that the superficial mark found on the neck of the child arose from this cord, and this suspicion is moreover confirmed by the nature of the child's death (apoplexy), since those strangled often die apoplectic. It only remains to be ascertained whether the mark found on the neck had an appearance similar to those found on the necks of persons strangled while alive. The medical inspectors do not hesitate to *deny* that this was the case in this instance. The mark of the cord found on those hanged or strangled (while alive), is seen in most cases (whatever may be its extent) to exhibit on the body a more or less broad and deep dirty yellowish-brown furrow, in which the skin is dry and leathery, hard to feel and to cut, or—in less numerous cases—it exhibits a bluish-red furrow, in which extravasations are sometimes found on incision. The protocol of the dissection declares that not one of these symptoms was found in this case. On the contrary, when a ligature is applied round the neck of a *corpse* it produces either a leathery dirty yellowish-brown mark, not readily to be distinguished from that produced during life, or one scarcely depressed, scarcely visible, somewhat distinguishable by its whiteness from the rest of the skin, and neither hard to cut nor to feel—consequently a mark *precisely* similar to that found by us on the child of the woman K. Since we are therefore indubitably justified in assuming it to be at least extremely probable that the child was not strangled (while alive), but that the ligature was only applied subsequent to its death, we have only to inquire whether the fatal apoplexy could have arisen from other causes? There can be no difficulty in answering this question affirmatively. Apoplexy is a tolerably frequent cause of death among new-born children, and the conditions attending the birth of this child were favourable to its occurrence. The mother was alone and helpless, and gave birth to her child in a cold, unused kitchen, in the depth of winter (17th of January). Suffocation of the child by the pressure of the mother's body, which the midwife supposes may have been the cause of death, is not justified by the appearances found, since that would have produced death by asphyxia and not by apoplexy, the symptoms of which were not found in the body. The medical inspectors believe they have sufficiently discharged their duty in determining the cause of the child's death by scientific reasoning, based on the appearances found on dissection, and it is not their province to determine the reasons which may have induced the accused to place a ligature round the neck of her child born alive, and already dead from apoplexy. However, should we hazard the opinion that she has done this for the purpose of assuring herself that her child should not come again to life, we could justify our opinion by cases which have occurred in our own experience. No importance is to be attached to the statements of the woman K., which are seemingly opposed to this opinion, as is sufficiently proved by the contradiction involved in her assertions, in proof of which we would only now refer to the fact, of the truth of which we are the competent judges, that the umbilical cord of the child has certainly been divided by a sharp instrument (cut), as is evinced by its sharp and smooth edges, but it is by no means proved that it has been tied, so that in this respect also the use of the cord is suspicious." We therefore gave it as our opinion, "that it is to be assumed as extremely probable that the death of the child has been caused by apoplexy, and not by strangulation, and that the cotton cord has been bound round the neck of the child after it was already dead." In accordance with this opinion, the accused was acquitted of the murder of her child, but condemned to ten years' imprisonment, with hard labour, for concealment of pregnancy and delivery, according to the penal code then existing, which was truly Draconic in regard to this. (Our present penal code no longer punishes concealed pregnancy and delivery, but only—besides child-murder and the procuring of abortion, §§ 180-182—the secret burial or disposal in any other mode of the body of an illegitimate child by its mother, § 186.)

CASE CCLXXIX.—DOUBTFUL CHILD-MURDER BY STANGULATION.

This case was unusual and resembled the foregoing. The body of a mature new-born male child was found one April in a garden in the following condition:—A piece of cloth, three feet long and one inch and a-half wide, tied in a knot at one end, was bound tolerably firmly round the neck. From the knot just mentioned, which lay over the nape of the neck, a woollen cord, two lines broad, was bound twice round the neck so firmly, that a finger could not be passed beneath it, and from the right side the cord was passed just as firmly through the mouth and round the face, so that the mouth was forced into a shape like an animal's snout, and turned towards the left side. The placenta, which weighed about thirteen ounces (imp.), was found lying near the child. The mark of the cord was two lines broad and one line deep, perfectly white, soft, and unecchymosed. The diaphragm stood between the fourth and fifth ribs. The left lung was completely retracted, the right one occupied about three-fourths of the cavity; the former was of a liver-brown colour, the latter of a cinnabar-red, marbled with blue. Incision into the left lung produced no crepitation, gave vent to no bloody froth, and it sank entirely under water; every part of the right one, however, floated perfectly, and incision into it produced crepitation and the escape of bloody froth. The heart was firm, the coronary vessels perfectly empty; the trachea quite normal and empty. Precisely at the vertex there were several purplish-red patches of dark coagulated blood, each half-a-line thick, lying on the periosteum. The cranial cavity was hyperæmic. We accordingly assumed, that this mature and viable child had been born precipitately, probably falling on its head; that very soon after the commencement of respiration it had died from apoplexy, and that it had been strangled after death and flung over the wall. In this case also it was to be supposed that the mother, who was never discovered, had adopted this remarkable procedure before disposing of the body of her child, in order to prevent its possible return to life, a procedure which, if carried out on a living child, would have left the most striking proof thereof on the external surface of the body.*

Case CCLXXX.—Rape and Murder by Strangling.

A rare example of a double crime gave occasion to the following medico-legal case, which was not an easy one to unravel. In May, 18—, there were found in one room, in one of the most populous streets of Berlin, two bodies, one a male and the other a female. The latter was that of a girl, aged 17, who was said to have been first violated and then strangled. Near it lay the body of the workman N., the supposed criminal, with its head shot off. This body was not dissected, and regarding it we have only to remark, that no trace of seminal ejaculation, nor anything else remarkable was found upon its penis. The following were the most important results of the dissection of the female:—The body was of the usual corpse-colour; on its back there were already green stains from putrefaction. The tongue, somewhat swollen, projected two lines in front of the teeth; there were no foreign bodies found either in the mouth or in any of the other natural cavities; fæces had escaped from the anus; gentle pressure forced a whitish froth from the vagina, which, microscopically examined, displayed *nothing* but broken-down epithelium. "On the

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* In regard to the partial sinking and swimming of the lungs, *vide* Cases CCCLIII. to CCCLXI.

right side of the neck, close beneath the edge of the lower jaw, there was a brownish-yellow mark four inches and a-half long (inclusive of an interruption of two-thirds of an inch), and half-an-inch broad, ending at the angle of the jaw. At its extremity there was also a similar brownish-yellow mark running obliquely downwards, and finally, towards the nape of the neck there was just such another mark half-an-inch long. Repeated incision in the course of this mark brought to light no ecchymosis. On the left side of the neck, from the angle of the lower jaw towards the nape of the neck there were two parallel reddish-blue stripes, three inches long and a quarter-of-an-inch broad. There was no depression in the course of any of these marks. Incision in the course of the marks last described, proved them to be not hard to cut, and displayed no trace of ecchymosis." The lips and countenance of the deceased were pale and not swollen, the eyes were not protuberant, the vagina was not gaping; its entrance was still closed by a much dilated circular hymen, on whose upper and lower segments small lacerations were distinctly visible. The mucous membrane of the *labia minora* was of a bright-red colour, but incisions did not reveal any ecchymosis. The whole of the internal edge of the hymen was of a greyish-yellow colour from commencing putrefaction. No fluid or dried blood was found either in or upon the genital organs. No trace of any other injury, except those marks described as seen upon the neck, was found upon the body.—Head: the dura mater contained but little blood, the pia mater "contained an unusual quantity," all of the sinuses were almost empty of blood. Both cerebrum and cerebellum were normal and tolerably full of blood, though not unusually so. Thorax: "the larynx and trachea were uninjured, the latter was opened throughout its whole length, and displayed *no* contents, but a dark brownish-red (putrefactive) coloration of its mucous membrane." In both pleural cavities there were from two to three ounces of a dark-fluid blood. The lungs were not remarkable in colour, they crepitated throughout, and were healthy in organisation, and the amount of blood contained in them was *not* unusual. "The heart's substance was flabby, its coronary vessels and its cavities empty of blood." The large thoracic veins were also empty of blood. Abdomen: in regard to its condition we only quote the statements of the protocol, that the liver was pale, the stomach distended with potato soup, the kidneys *not* congested; the intestinal tract pale, nowhere displaying any congestion; the bladder empty; the *vena cava* empty of blood;

the uterus that of a virgin, and both ovaries contained hydatids the size of a walnut (in a virgin, aged seventeen !). According to a medical certificate laid before us, the body was found with its hands bound and with a cord wound round its body; no traces of any such violence were, however, found upon it.

We thought we could best determine the cause of death in this murdered person by the negative evidence, and in the summary opinion given at the conclusion of the minute of dissection we thus expressed ourselves :—" (1.) The deceased has not died from suffocation nor from apoplexy; (2.) she has not died from any internal disease; (3.) not one of the appearances found is favourable to the supposition of poisoning; (4.) in spite of the general anæmia, the absence of any important injury precludes the idea of death from hæmorrhage; (5.) consequently death must have resulted from *nervous apoplexy ;* (6.) the injuries upon the neck had precisely the same appearance as in the most of those killed by strangling or hanging, and therefore (7.) having regard to what we have already stated, and to the fact, that death from strangling or hanging is frequently caused by nervous apoplexy, we must assume that the deceased has been killed by strangling; (8.) the appearances on dissection have not distinctly proved the assumption of rape having been committed just before death, complete immission has certainly not taken place, but it is indubitably probable that the sexual organs had been unchastely meddled with a short time before death."

The case was not further judicially investigated.

CASE CCLXXXI.—MURDER BY STRANGLING.—HORIZONTAL POSITION OF THE BODY.

On the second of the Whitsuntide holidays, 18—, at 11 o'clock in the forenoon, consequently in broad daylight, the house proprietor L——, as he came home from church, found to his astonishment his house-door standing open, and his wife lying on the floor with a cord bound round her neck and fastened to the foot of the bed ! There was a recent wound upon her forehead, and there could be no doubt that the woman had been attacked, stunned by a blow on the head, thrown on the ground and strangled. The mark of the cord ran, with intermissions, from the right to the left mastoid process across the hyoid bone. It was superficial, three lines broad, of a dirty brownish-red colour, hard to cut, but not ecchymosed, precisely as such marks usually are. The skull-bones were uninjured, but the congestion within the cranial cavity was very evident. The lungs, covered with old adhesions, were turgid with watery blood, with which the right side of the heart was also quite distended, whilst the left was perfectly empty. The tracheal mucous membrane was strongly injected, and covered with fatty particles of food, which must have gained admission during the spasmodic movements of deglutition and eructation attending the last agony, since similar matters were found in the œsophagus, and the stomach was half full of them. The jugular veins were not congested. In the abdomen we again discovered a remarkable hyperæmia of the kidneys, thus confirming the statements I have already made (p. 130, Vol. II.) regarding the value of this symptom as evidence of death from asphyxia. The vena cava was also distended with black fluid blood, the liver and omenta were not, however, particularly congested. The decision in this case was, as is evident, very easy. The deceased must be assumed to have died from a combination of asphyxia and apoplexy occasioned by strangulation, and the superficial wound on the forehead had no share in producing death. The murderer was never discovered.

CASE CCLXXXII.—MURDER BY THROTTLING.—SUSPENSION OF THE BODY.

This serious criminal case was particularly interesting from the number of separate queries which we had to answer at the time of the dissection. On the evening of the 20th of March, 18—, the body of an unmarried dressmaker, aged 34, who lived by herself, was found suspended by a cord, two lines thick, from the latch of her room door, which was about four feet from the floor. She hung close to the door; the clothes on her breast and neck were in disorder, her right knee was bent and the leg extended backwards, but the left inferior extremity was stretched out in front. About a foot from the body there was a large stain of blood in the room, and several lesser stains were visible, extending towards the middle of the room, where they ceased. The countenance of the body was soiled with dried blood. A physician and a police official were both called in; the former supposed it to be a case of suicide, and ordered the body to be cut down. The police official, however, was induced by the circumstances of the case to suspect that a crime had been committed, and before night the Judge appointed for the investigation of such matters, the director of the police, the public prosecutor, and myself were all summoned to the spot by means of the telegraph. Finger-marks on the throat, a large ecchymosis over the left eye, the blood in the room, the disordered state of the clothes, and a trifling abrasion of the skin over the larynx, made it at once evident that the deceased had been murdered.

She had not been seen since the 18th; late on the evening of that day, a neighbour had heard a whining sound of short duration coming from the apartment of the deceased, but she paid no further attention to it. On the 21st, we proceeded with the medico-legal examination of the body: the temperature at this time ranged during the day from — 4° to 5° R. = 23° to 20°.75 F., and during the night from — 6° to 8° R. = 18°.5 to 14° F. The abdomen was already somewhat greenish. Both lids of the left eye were livid and truly ecchymosed, but *not swollen.* There was dried blood upon the face. From out of the open mouth protruded a full half-inch of the tongue, blackish-red, swollen and firmly clenched between the teeth. No blood flowed from the sexual parts, which had been deflowered, none was found upon the shift in front, and also not a trace of semen. On the shift behind, however, there were a few spots of blood that looked as if washed out with some fluid (urine), and a small quantity of blood could be expressed from the anus with a cloth. Round the whole of the throat, without any interruption, there ran across the larynx a dirty brownish-yellowish-red furrow, two lines deep and as many broad, hard, and everywhere unecchymosed, which disappeared upwards behind the ears. A circular patch, one quarter-of-an-inch in diameter, upon the left angle of the lower jaw displayed the same colour and consistence, as also did a semicircular patch half-an-inch long and three-quarters of an inch broad upon the right angle. Over the middle of the larynx there was a recent abrasion of the skin, evidently made by a finger-nail. The points of the fingers were of a livid-red; on the left thumb there was some dried blood. There was no hair nor anything else in the hands. The dura mater was much congested, the pia mater not unusually so; the brain and the plexuses were not remarkably full of blood, and all of the sinuses were only half full. The jugulars also did not contain any remarkable amount of blood; the larynx and trachea contained a few drops of bloody froth; pressure on the lungs forced no froth or anything of that kind upwards. The cartilages were perfectly uninjured. The slate-blue lungs were healthy, but contained much dark fluid blood and œdema. In the pericardium there was about half-an-ounce (imp.) of bloody serum. The right side of the heart was very hyperæmic, the blood dark and somewhat treacly, the left side contained only a few teaspoonfuls of similar blood. The large thoracic vessels were, however, turgid. The liver was pale, the stomach perfectly empty, the intestines pale, the kidneys in this case once more distinctly hyperæmic, the urinary bladder distended, the uterus anæmic, the vena cava distended with blood. In the summary opinion we assumed what we subsequently reasoned out: (1.) that the deceased had died from pulmonary and cardiac apoplexy; (2.) that death had been caused by external violence; (3.) that this had been produced partly by throttling and partly by strangling; (4.) that the marks upon the throat had been caused partly by the pressure of the fingers and partly by scratches; (5.) that the ecchymosis of the eye had no connection with the death; (6.) that it is to be assumed that the deceased first received a blow upon the left eye, and was then throttled, and that *very shortly* afterwards, because after the lapse of any considerable time the eyelids would have been more ecchymosed, and in particular, they would have been swollen. After the deceased had been thus half-killed (asphyxiated), or after she was quite dead, she had been suspended, in either case the mark of the cord on the neck would have been the same; (7.) (in answer to inquiries) the perpetrator of the deed must, in making his attack, have stood in front of the deceased, but might also have lain upon her; (8.) that hæmorrhage from the nose had followed the blow upon the eye, and that the blood in the room came from this source, and not from the catamenia, which were not present; (9.) that the traces of blood on the hinder part of the shift and in the rectum are not to be regarded as rare phenomena, considering the kind of death suffered by the deceased; (10.) that as she had been deflowered long previously, and as no trace of semen was found in the body or on its clothing, it is impossible to say whether the murderer had violated her in the first place; (11.) that from the degree of putrefaction it was to be assumed that death had taken place about three days previously; (12.) that from the perfectly empty state of the stomach, death had probably occurred from six to eight hours after any solid meal. This question was put not only for the purpose of determining the probable time at which the deed was committed, but specially because in searching the house, tea-things with the remains of tea and sausages were found, and thence it was to be supposed that the perpetrator of the deed (probably a man, judging from the cigar ashes on the floor) had spent the evening with the deceased. Bread and sausages taken shortly before death must of course have been found in the stomach. The above suspicion, therefore, was shown to be groundless, and, on the other hand, supposing that the deceased had dined about one o'clock, it was probable, and as such we assumed it, that the murder had been committed between 7 and 9 in the evening. An acquaintance of the deceased, the gamekeeper Putlitz, was imprisoned on suspicion, and shortly thereafter he made a full confession, in which he described the occurrence in all its details *exactly* as we had stated them at the time of the autopsy. To a fellow-prisoner he related that he had had sexual connection with the deceased before he murdered her! * But, ere long, the accused recanted this confession, and in spite of every representation, particularly of the remarkable circumstance that he had described the occurrence precisely as the experts had declared it must have happened, though of course he did not know their opinion, he obstinately declared that he knew nothing of the matter. The jury trial lasted five days, and no exertion or skill was spared to obtain the conviction of this obstinate liar. In the course of the trial, however, so many important circumstances were found to point towards the prisoner, that the jury found him guilty of murder. In the course of the trial, the noose found round the neck of the body was laid before me, and I was asked if this noose were tied after gamekeeper fashion? True to the principles I have already laid down (p. 138, Vol. I.), I at once declared myself incompetent to answer such a question, and proposed that it should be referred to a gamekeeper, and this declaration was at once accepted by the three parties concerned—the presiding Judge, the public prosecutor, and the advocate for the defence. I have still to add the following:—The murderer had said to his fellow-prisoner when he made his confession to him, that "the bitch had stuck her tongue out at him in anger before she went to Peter!" In saying this he alluded to the prolapse of the tongue, which he had observed on the body when brought forward to recognise it, and this expression was afterwards employed as a most important testimony against him at the public trial, because it was rightly supposed that his fellow-prisoner, whom he afterwards accused of lying, and who had never seen the body, could not possibly have discovered that the tongue did protrude. Had we not caused this appearance to be entered on the minute when we made our external inspection of the body, when no suspicions of its future utility could possibly have arisen, the advocate for the defence would have had one weapon more against the accusation. This, therefore, affords another proof of the caution and accuracy which the medical jurist must exercise in every case! The murderer was executed.

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* *Nota bene* in regard to similar cases,—the perfectly negative results of the examination of the genitals and clothes.

CASE CCLXXXIII.—MURDER BY HANGING OR THROTTLING?

The following serious and difficult case was precisely similar to that just related. On the evening of the 22nd April, the housekeeper B. was found dead in her chamber. Her body was so fastened with a green woollen cord, wound round her neck and tied to a bedpost on each side, that her head hung forwards while her body and feet lay upon the floor. The body was completely clad, and had on a crushed bonnet. The hands lay at the side of the body, the palms outwards; the hair was not much disordered; on the floor, beneath her face, there was a large blood-stain upon the polished deals, and another upon the black silk dress which she had on. The broken-up condition of the presses, and the paper scattered hither and thither, at once made certain the fact that the murder had been complicated with robbery; and, very shortly afterwards, the journeyman joiner Pfab was discovered to have been the criminal. He declared that he had, on the Sunday, slipped in *all alone* into the empty dwelling, and when surprised by the return of the deceased from church, and her instantaneous outcries for help, he commenced a struggle with her. He stated that he instantly seized the woman by the throat, so that he "had it between his fingers," at the same time stopping her mouth because she kept constantly crying out; they fell together on the floor, and he "kept squeezing her throat for about a minute," while she kept throwing her arms about and scratching his hands till she became senseless. He then sprung up and cut a piece of cord from the window-blind to bind round her neck and prevent her from crying, whereupon she called out, "Oh God, I have indeed deserved it!" He, however, only put the cord quite loosely round her neck, so that she might afterwards rid herself of it. Among the many obvious falsehoods contained in this declaration, I brought forward, in the first place, the fact *that Pfab could not have committed this deed unaided*, as he obstinately declared, but that he *must* have had, if not several, at least one assistant. The nails of all his ten fingers were so deformed that they only extended half-way to the points of the fingers. The scratches on the body could not therefore have been produced by these nails. At length Pf. confessed that he had with him a boy Schulz, aged 14. He stated that this boy cut the cord from the window-blind, and bound the elbows and feet of B. together from behind, these ligatures being afterwards removed; and this agreed with the appearances found on the body. As B. still cried aloud, a third piece of cord was tied round her neck. "I know positively," said he, "that she was still alive; I heard her breathing stertorously after the cord was tied round her neck, and saw her move her feet;" indeed, still later, when both criminals, who first breakfasted in the kitchen! were leaving the house, the girl was stated to be still alive. Schulz, on his part, described the proceedings as follows:—Pf. seized the girl round the neck from behind, with both hands; a struggle then took place, during which the girl "cried out," and as, after she fell, she still kicked with her feet, he (the boy) tied her legs together. "Pf. let the girl lie thus for about a quarter of an hour, squeezing her throat with both hands all the time. Even then the girl was still alive, for she moved and bit at Pf.'s hand. He then with much exertion put the cord round the girl's neck, and pulled both ends of it tightly, whereupon she moved no more." Two days subsequently we examined the body, and found only the perfectly negative appearances betokening death from neuroparalysis, wherefore I need only now relate the important local phenomena observed. The swollen tongue protruded for two lines beyond the teeth. The shift, in the neighbourhood of the sexual organs, was much stained with blood and urine. In the middle of the forehead there was an ecchymosed mark, half-an-inch long and the same in breadth, and a blood-red excoriation of the same size upon the chin. Round about the whole neck, across the larynx and behind the ears, there was a visible furrow two lines broad and one line deep, coloured green (by the green cord), hard to cut, and unecchymosed; beneath the chin there was a hard, brownish-red, unecchymosed patch, half-an-inch long; on the left cheek, at the edge of the lower jaw, there was a similar semicircular patch, two lines long; the whole of the upper surface of the nose was brownish-red, and ecchymosed. On the throat there were seven patches, stretching from the right side, which yesterday appeared to me blood-red, but which are now of a dirty-brown colour. All of these patches were more or less semicircular in shape, from two to four lines long, soft, and unecchymosed. The convexity of some of these patches was towards the right, of the others towards the left. A similar patch was visible on the back of the right thumb, and at the upper part of the breast-bone there was a tolerably recent scratch. The interior of both carotids displayed no rupture. In our opinion, we assumed, in accordance with these appearances, that a struggle had taken place, and that all the more readily that on the day after the commission of the deed, I had observed numerous scratches on the back of both of Pf.'s hands. We then explained that neuro-paralysis was just as frequently a cause of death after throttling as after hanging, and then proceeded to answer the difficult query, Which of these procedures had occasioned death in this case? "Since both of these modes of committing murder—throttling and strangulation—kill rapidly, consequently, when both of these modes have been employed, either simultaneously or in rapid succession, one must have been exerted upon a body either already dead or in the act of dying, consequently the priority must be assigned to that mode of procedure which shall have left traces of living reaction on the body, which has not been the case with the other. Such is not the case here, since the finger-marks on the throat of the body (throttling) are just as distinct as the mark of the cord on the neck. Both of these marks have, for example, precisely the colour, appearance, &c., which they present in those who have been indubitably throttled or strangled while alive; and the kind of death caused by both is, as we have already pointed out, the same. Another difficulty in the answering of this query, is, however, presented by the fact that the mark of the cord produced by strangling any one *just dead* is not to be distinguished from that produced by strangling a person yet alive; and that if B. were already killed by throttling when the cord was applied round her neck, this must indubitably have ensued *immediately* after she had ceased to live. The reverse of this is also true, *though not in so decided a manner* that finger-marks forcibly impressed on the throat of a person just dead may leave traces on the body precisely similar to those here found. Nevertheless, quite independent of the confessions of both the accused, according to which the hands were employed before the cord, there is in this case one circumstance which makes this indubitable—

we refer to the condition of all the finger-marks on the throat of the deceased on the day before the dissection, when they were fresh and "blood-red," as three of them indeed were on the very day itself, while the others were, as is usual after some lapse of time, of a dirty-brownish colour. Such a bright blood-red colour is, however, never produced by injuries inflicted on a dead body, either immediately after death or at a subsequent period. Since, therefore, it cannot be disputed that the deceased was still alive when she received the contusions upon her face and head, by falls, blows, &c., because otherwise no such considerable ecchymoses could have formed upon the parts referred to; so, after what we have already said, we assume it as proved that she must have been still alive when the scratches and finger-marks were made upon her throat, both of these injuries must therefore have preceded her strangulation. Since, however, as we have already stated, the mark of the cord cannot prove whether the deceased was still alive, or was already dead when it was applied round her neck, we must endeavour to obtain other proof of this. In this respect it was most improbable that B., especially as she was menstruating, and consequently in a state of excited irritability, should not be *rapidly killed*, when a powerful man, like Pfab, who, as we may well believe, was in a state of "great excitement," and dreaded discovery and punishment, squeezed her repeatedly (as the traces prove) on the mouth, throat, and chest, and that with both hands, whilst indubitably Schulz also assisted in these manipulations, since the nail-marks *could* not have arisen from Pfab's fingers. When we also consider that death by throttling or strangulation is one of the most rapid, it would indeed be most astonishing that B. should not have died rapidly under such treatment, even if we leave altogether out of account the "full quarter-of-an-hour" which Pfab expended in accomplishing it, according to the deposition of Schulz. Moreover, the position in which the hands of the body were, palms outwards, when found, shows that the deceased was already dead when she was fastened to the bed, and that she had been dragged thither as a dead body. Since, had she been alive, the hands would not have assumed this position; and had death ensued from the use of the ligature, it is evident that this was still less likely to have been the case. Whether the clothes of the deceased were stained of the yellow colour of the floor by being thus dragged along the floor to the bed, and allowed to fall there, or whether this had already taken place during the struggle and falls while alive, we must leave undetermined. It is easy enough, however, for those acquainted with such matters, to answer the question, What could have induced the murderer to tie up a woman already dead? since it is well known that criminals frequently place their victims in such a position as may make suicide probable, in order to conceal their crime, and just as often strangle or inflict severe injuries upon those already dead from the dread of their coming to life again. We consider that, from the condition in which the accused left the dwelling they had robbed, they could not have expected the case to be taken for one of suicide, and therefore that they strangled the woman from the latter idea, and we also think that it was *for this end also* that Pfab made Schulz tie the legs and arms of the deceased together, till, after their protracted stay in the house, they became satisfied that death had actually taken place. This idea of ours is certainly directly opposed to that part of Pfab's confession in which he mentions his hope that B. might have freed herself. We think it scarcely necessary to point out all the manifest and gross untruths contained in the depositions of the accused hitherto made. It is, for instance, a barefaced lie when Pfab states that he only tied the cord 'quite loosely' round the neck; and it has been already contradicted by Schulz, who says he saw Pfab tie the cord as tight as possible, and pull it with both hands. The appearance on the body of the mark of the cord as a furrow, one line deep, all round the neck, corroborates the statement of Schulz, and flatly contradicts that of Pfab. Equally untrue is Pfab's statement that B., while being strangled, 'leant upon her arms,' since these were found in quite a different position. Further, his declaration that the deceased breathed stertorously, and moved her feet after he had tied the cord round her neck, is undeserving of belief, especially when we consider that he did not hesitate to declare the manifest and perfectly obvious untruth, that B. was yet alive when he left the house." Accordingly, we declared our belief to be: (1.) That B. had died from nervous apoplexy; (2.) That death had been caused by violence applied to the throat; (3.) That, in any case, the contusion caused by blows, or falling upon the forehead and nose, as well as the pressure of the fingers on the throat and mouth, preceded the strangling; (4.) That the deceased was still alive when subjected to the violenee just described; (5.) That it is to be assumed, with a degree of probability almost amounting to certainty, that death has been caused by throttling, and that, consequently (6.) There is the same amount of probability in favour of the opinion that B. was already dead when the cord was put round her neck; (7.) That the mode in which the cord was fastened round the neck leaves no room to doubt that B. must have been killed by strangulation, granting that she was then alive. Pfab was executed, and the boy condemned to many years' imprisonment.

CASE CCLXXXIV.—DOUBTFUL SUICIDE.—HORIZONTAL POSITION OF THE BODY.

The following is the most remarkable case of many similar which have come before me in the course of my official experience, and it was carried through all the three professional courts. I have already related it, thirteen years ago, in No. 4 of my "Wochenschrift" for 1849, under the title "Has the married woman Claasen hanged herself, or has she been strangled?" and I shall now only reproduce the most important points. The question of murder or suicide was in this case most unusually difficult to decide, since the evidence for the guilt of the accused husband of the strangled woman was almost as strong as for his innocence; and we required to be very careful, as indeed in every case, to keep close to the *medico*-legal facts, and not to suffer ourselves to be led astray by the non-scientific part of the evidence.

A joiner's wife, named Claasen, was found one night near the bench in the workshop *lying dead on the floor* on her back, half-turned to one side. She was completely clad in black, and had a piece of string wound several times round her neck and firmly tied in a knot on the left side. Two sheets of paper were stuck in her girdle, in which there was written and subscribed with her signature, a statement of her intention to destroy herself, the words "my husband is innocent" being several times repeated. The clothes on the body were quite tidy, but the hair hung in disorder from the head. The woman's husband, who was present, was very tipsy, and so little disturbed that he very shortly commenced to take bread and coffee beside the body. He declared himself (to the end of the whole investigation) to be perfectly guiltless of the death. His daughter, aged seven years, declared, however, that her father had seized her mother by the throat, dragged her from the sitting-room into the workshop, and thence into the bedroom; that he then sought for a piece of string with which he again went into the bedroom and shut the door. The whole day after he went out and in continually, threatening to kill [illegible] chamber of her and [illegible]. At last, towards evening, he [illegible] [illegible] the verandah and laid her near the working-men. He then called his youngest daughter, tied a cord round her neck, and again went out, upon which her sister removed the cord.

The following were the most important appearances found at the dissection of the woman Claasen, which took place five days after her death in December. A [illegible] the tongue lay behind the teeth. The abdomen was of a [illegible]-green colour; no trace of any injury was to be observed; there was [illegible] of the vagina, [illegible] here and there in the limbs, [illegible] of the whole countenance and of the ears, dark-red colour of [illegible] was [illegible] [illegible] irregular abrasions. "Round about the whole of the neck there ran a parallel double furrow, one line [illegible], which was visible [illegible] to the upper vertebral spinous processes." On the anterior part of the neck this furrow was brownish-red and [illegible] parchmentised, the rest of it was pale and soft to cut. There was no redness in any part of it. Close beneath the right angle of the lower jaw there was in the furrow a roundish [illegible] about the size of a pea, the skin over which was quite uninjured, soft, and not parchmentised. The lungs were larger than usual, and gorged with dark fluid frothy blood. The right side of the heart, the coronary vessels, and the large thoracic vessels were also distended; in the left ventricle there was only half-a-tablespoonful of similar blood. The larynx and trachea were perfectly uninjured and empty, but their mucous membrane was "distinctly and unusually injected." Within the cranium the vascular congestion was strongly marked, and the same was the case with the kidneys and large abdominal veins. It was, therefore, indubitable that the deceased had died from a combination of thoracic and cranial apoplexy, that is, from sudden stoppage of the circulation; and the appearances dependent upon this form of death were unusually developed, and that to a degree such as we had seldom seen the like of. We assumed in the first place, that so exquisite a case of thoracic and cranial apoplexy of itself betokened a violent death, and of course answered affirmatively the question put before us: whether the cord found round the neck of the woman Claasen was an instrument fitted to produce her death? Since a ligature of *any* kind *firmly* applied *could* produce death. On the other hand we did not hesitate to state, that in our opinion, the cord had not been the cause of death in this case, but had been tied round the neck of the woman Claasen after she was dead. The piece of string was sixteen inches long, and could not have been very tightly bound round the neck, and a much greater amount of violence must be supposed to have been applied, such for instance, as the forcible compression with one or both hands of a powerful man. The absence of any trace of vital reaction must not be regarded as affording any proof to the contrary, since we know that the utmost violence may be employed and produce a corresponding amount of internal injury without a single trace of reaction being visible on the surface of the body.* In like manner, it cannot be wondered at, that the murdered woman had not cried out, since it has been proved that she was a sickly person, while her husband was a very powerful, tall, and coarse man, and the attempt, therefore, and the deed must in this case have been almost simultaneous. We again examined the condition of the mark of the cord, and showed, that though the mark of a ligature may be artificially produced on a body after death, which shall be perfectly undistinguishable from one produced by strangling during life, yet that the largest part of the mark of the cord in this case, as we have already described it, namely, the perfectly white and soft portion, was entirely similar to the mark of a ligature applied some considerable time after death; all this of course went to confirm the supposition, that the death of the woman Claasen had been produced by some other means than the string, and that this had been only applied after death, apparently for the purpose of making suicide more probable. This, properly speaking, disposed of the third, the most important, question put before us regarding the possibility of suicide. "Nevertheless," we went on to say, "it may not be superfluous to recount the following facts which tell against the suppotion of suicide, leaving altogether out of view the suspicious writings found in the girdle and other circumstances, none of which belong to our department." "The knot at the one end of the string is in the form of a loop and has been carefully tied, and even the knot at the other end has evidently been made with some attention. It is not very probable that a suicide should so carefully prepare or tie the cord, and it is not easy to be seen why the woman Claasen, even supposing she had determined on committing suicide by strangulation, should not have selected the usual simple mode of hanging in preference to self-strangling, which is the rarest of all possible kinds of death. Moreover, the care employed in the preparation of the cord, betokens it to have been done after the commission of the deed, and with some expenditure of time. And finally, in regard to the position in which the body was found, it would not be difficult to show, that it is perfectly impossible for the statement of the accused to be true, viz.: that he discovered the deceased dead from suicidal strangulation in the position in which she was found near the joiner's bench. In the first place, it is not easy to see why the woman Claasen, supposing she had determined on strangling herself, should not have done this while in bed in her own room, where she lay the whole afternoon, but should prefer leaving this to lay herself down on the floor of the workshop. She was also found 'lying half-turned upon her side, her head slightly resting upon her right arm,' and we believe we are not saying too much, when we state, that the annals of medico-legal science do not contain another single instance of an individual self-strangled being found in a similar position. On the other hand, this position tends rather to confirm the statements of the little seven-years-old girl, and must have been produced after death, by dragging the body out of the dwelling into the workshop." After I had maintained these well-weighed reasons at the subsequent public trial, the forensic surgeon, who had assisted me at the dissection, and who, according to the regulations, had signed the reasoned report along with me, most unexpectedly drew back, and declared that he dare not positively exclude the supposition of suicide. We had, therefore, to refer the matter for arbitration; first, to the medical college of the province, and next, when this was not accepted, to the ministerial scientific commission. The opinions of both of these courts assumed the fact of murder, not as I did with certainty, but with more or less probability. The accused was condemned to imprisonment with hard labour for life. Readers who may feel interested in the many extraordinary (non-medical) points which turned up in the course of this remarkable trial, such for instance as that two experts, in writing, declared the writings found in the clothes of the deceased to be in her own handwriting, while two others declared them to be in the handwriting of the accused! &c., will find them all detailed in the number of my "Wochenschrift" already referred to. I omit them here because they would occupy too much space.

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* *Vide* § 33, p. 109, Vol. I.

CASE CCLXXXV.—SUICIDAL STRANGULATION IN THE RECUMBENT POSTURE.

Having in the previous case referred to suicidal strangulation as the rarest kind of death, and having never seen an undoubted case of the kind, I could not but be most exceedingly surprised when, a few months after the occurrence of the case of the woman Claasen just related, there came officially before me an undoubted, and therefore extremely instructive, example of *suicidal strangulation in the recumbent posture.*

One night in April, the step-daughter of the widow L. heard her get up and go into the adjoining kitchen. She soon fell asleep again, and was astonished next morning to find her mother's bed empty and her mother lying a corpse in the kitchen. She lay stretched out on some rags and linen lying on the kitchen-floor close to the outside door, which was shut and bolted on the inside; and there was no other entrance to this kitchen save this one and that through the bedroom. Upon a stool near the body there lay a bread-knife and a penknife, both somewhat stained with blood. There was upon the body a superficial incision on the left wrist-joint and one on the left elbow-joint. Round its neck a piece of thin string was thrice wound very tightly and fastened *in front over the larynx* in a simple knot. At the dissection we remarked in this case a similar lividity of the vaginal mucous membrane observed in the case just related. The incision on the left wrist-joint was perfectly horizontal, that on the left elbow-joint ($\frac{3}{8}$ of an inch long) ran from above downwards and from without inwards, which of course at once gave rise to the suspicion of these being self-inflicted. On the neck I found a threefold furrow, one line broad, white, superficial and soft to cut, which was only in isolated patches of a feebly-bluish colour, but was nowhere ecchymosed, as proved by incision. This furrow ran across the larynx, but only one of the rings could be traced without interruption right round the neck. The condition of *this mark* of strangulation, which was quite indubitably produced on an individual alive when strangled and killed thereby, proves once more how cautious we ought to be in judging of the mark of the cord. Asphyxia was the cause of widow L.'s death. Not only were both lungs distended with dark fluid blood, but we had once more the rarely-occurring opportunity of observing the presence of *petechial ecchymoses* beneath the pulmonary pleura of an adult. We have already* directed attention to the occurrence of these ecchymoses in cases of death from asphyxia. The coronary vessels of the heart were strongly congested; the heart itself, however, and particularly the right side, did not contain any remarkable quantity of blood. The valves of the heart were insufficient, and this in regard to the probability of suicide was not quite without significance. The mucous membrane of the trachea was remarkably red, injected, and quite covered with bloody froth. The jugular veins contained but little blood. The brain displayed no apoplectic congestion, but death from asphyxia was in this case, as in many others, evinced more by a perfectly remarkable hyperæmia of the liver, the mesenteric veins, both kidneys and the vena cava, which were all perfectly turgid with the dark fluid blood characteristic of death from suffocation.

CASE CCLXXXVI.—SELF-STRANGULATION IN THE RECUMBENT POSTURE.

A few years after the occurrence of the case just detailed, there came before me another perfectly indubitable case of self-strangulation in the recumbent posture. The victim in this case was a tailor's wife, aged 49, who for years had been afflicted with deafness, diseased liver, and weariness of life. She slept in the same room with her husband and a grown-up daughter. On the morning of the 15th of May, these both awoke and found the mother's bed empty and her body in the adjoining kitchen. She lay, as I myself saw, flat on the floor, with her head upon a small bag of meal; round her neck a silk handkerchief was tied tolerably loosely, and over it a wet linen cloth was firmly twisted (Why had she wet the cloth?). The mark of the cord was not at all depressed, ran right round the whole of the neck across the larynx, was soft and white, with a few isolated faintly-bluish, unecchymosed patches. A paper in her own handwriting declaring her intention, left no doubt as to the reality of the suicide. The body was only inspected.†

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* § 40, Spec. Div. p. 126, Vol. II.

† It is doubtful whether self-strangulation in the recumbent posture had actually been committed in the case related by Gatscher (Wiener med. Wochenschr. 1856, Nr. 28 and 29). A peasant was found in the snow, with a cotton handkerchief twisted round his neck by means of a stick. The doubt about the self-strangulation in this case is all the less to be gainsaid,

CASE CCLXXXVII.—MURDER BY THROTTLING.

A very rich lady, aged 68, lived quite alone in one of the most populous and always open houses standing in one of the most frequented streets of Berlin, her only attendant, a female, came to her every morning. On the 29th of October, 18—, this old lady was found dead in bed with the bedclothes heaped over her, while her apartments exhibited the most striking and unequivocal proof that the murder had been combined with robbery. Trunks and drawers, presses and other receptacles stood open, plundered, and their contents scattered hither and thither; papers were strewn about the rooms, and close by in a dark sleeping apartment lay the body, which we saw in the condition about to be described, immediately after its discovery, that is, as was made highly probable, during the course of the long investigation, about thirty hours after death. The temperature having been tolerably high, putrefaction was already so far advanced that the whole of the head was of a blackish-green. The eyes protruded with reddened sclerotics, and the tongue, somewhat swollen, projected from three to four lines between the lips. On the neck, as well as on the half-bared bosom, there were in many places cuticular abrasions from putrefaction. Besides these, *recent scratches* were visible on several places of the left side of the neck. Two or three patches on this part were distinguished amid the hues of putrefaction by their dark-red colour, giving rise to the suspicion that they might be finger-marks. A very careful but ineffectual search was made for the mark of a cord, which, under the prevalent condition of the body, would have been difficult to find. Both hands were *very* firmly tied together behind her back with a common towel, which we were not at that instant authorised to loosen. A piece of calico was also bound round the legs above the stockings and petticoats. This condition of the body entitled us to conclude that there had probably been several accomplices in this crime.

The dissection took place the following day. The putrefaction was already extreme; the features particularly were quite unrecognisable, and the mammæ were blown out like two ox-bladders,

that it does not seem at all improbable but that this procedure was only carried out after death. The author referred to, with much justice, speaks of the "courage and determination" required to carry out *such* a kind of self-strangulation.

which was to me quite a novel result of putrefaction. The tongue, now projected two inches beyond the mouth, was very much swollen and blackish-green. "Amid the reddish-brown colour of the neck two small black patches are visible about the middle of the collar-bone and one inch from the sternum, which were, the one half-an-inch and the other the third of an inch long, somewhat hard to cut, and even yet permitting the detection of a trifling ecchymosis. On both wrists no mark of the ligature is to be detected, yet there is an irregular reddish ecchymosed patch an inch in diameter, and of a bluish colour visible upon the palm of the left hand. The lips appeared of a black-blue, but not ecchymosed." No foreign bodies were found in the mouth. The sinuses and other cranial veins were *empty of blood*, and there was neither extravasation nor anything else anomalous. I quote the description of the appearances in the thorax from the protocol of the inspection: "The trachea and larynx, opened throughout their entire length, are perfectly uninjured, and their mucous membrane appears of a dark reddish-brown colour. The lungs are still warm, and contain but *a small amount of blood*. In the left pleural cavity there is about half-an-ounce [illegible] of bloody serum. In the pericardium there is only a small quantity of serum. The heart is tolerably large, unusually fat, and all its cavities *quite empty of blood*. The neck veins and the large veins of the thorax likewise contain no blood. There is nothing remarkable in the state of the mouth and fauces." The whole of the abdominal cavity was also remarkably warm, and all its organs far advanced in putrefaction. The much congested liver was already beset with putrefactive bullæ, the spleen and even the kidneys were pultaceous; all the other abdominal organs were anæmic and only the vena cava still contained "much blood, and that very dark and fluid."

In this case, therefore, we had once more an example of what frequently occurs in medico-legal practice, viz. death from asphyxia, without its most important criteria being capable of being discovered or proved, the putrefactive process having completely obliterated them; and yet, in this case the murdered person had indubitably been suffocated, as every subsidiary circumstance tended to prove. But the blood was for the most part everywhere evaporated; and therefore, instead of the characteristic hyperæmia of the lungs and the right side of the heart, the former contained only "a small amount of blood," and all the cavities of the heart were "completely empty of blood;" and the brain, instead of being, as it so often, though not always, is in those suffocated, affected with a subsidiary hyperæmia, was quite empty of blood. Precisely similar reasons prevents in all such cases, as it did in this one, any proof of the suffocative character of the death being drawn from the condition of the larynx and trachea, since the white or bloody froth, formed by a mixture of air with the bronchial mucus and blood, and which is characteristic of the congestive condition dependant on asphyxia, is very early dissipated by putrefactive evaporation, and was so dissipated in this case. Finally, I cannot too often repeat that great care must be taken not to permit the hues of putrescence to be mistaken for that coloration of the mucous membrane of the trachea which forms one of the most important proofs of death from suffocation. I believe myself justified in stating that in every perfectly fresh body (without exception) whose death has been caused by suffocation, not purely neuroparalytic in character, there is present a (certainly more or less evident) congestive condition of the smaller veins of the mucous membrane of the larynx and trachea, which is always to be seen as a bright-red injection of the vessels. But I repeat (*Vide* p. 44, Vol. I.), that the trachea is the earliest internal organ affected by putrescence, and displays this in every case by a brown cherry-red colour, entirely the product of putrefaction and wholly independent of any stasis or hyperæmic congestion which may possibly be present, and which when present it conceals and renders completely unrecognisable. The body before us was already far advanced in putrescence. Nevertheless, we did not hesitate to assume as certain the fact of death having been caused by asphyxia, and, omitting those points just referred to, which are applicable to the present case, we subjoin the following quotations from the report of the autopsy. "In the first place, it is certain that the subject of this report, who was left by her son on the evening of the 27th October in perfect health, did not die from *any other* cause than suffocation, since the autopsy has not revealed even a suspicion, to say nothing of a certainty, that such might have been the case. In the next place, in spite of the putrescent state of the body, the dissection has revealed certain phenomena which are peculiar to death from asphyxia, such as the swollen tongue, the heat present in the lungs, the remarkably high temperature in the abdomen, the hyperæmic condition of the liver, and the congested condition of the *vena cava inferior*, which was filled with that peculiarly dark and fluid blood characteristic of asphyxia. Moreover, the examination of the body has also revealed sundry other facts indicative of death from suffocation. Among them we reckon the position in which the body was found and seen by ourselves, its hands tied behind its back, the legs bound together above the clothes, and the head pressed into the pillow, circumstances which all betoken the infliction of violence upon the body; secondly, and especially, the two patches on the neck, described in the protocol, which, since, in spite of the high degree of putrefaction, they were still hard to cut, and evinced on incision a distinct though trifling amount of ecchymosis, were distinctly referrible to the action of external violence, probably the pressure of two fingers. It is, however, impossible to determine merely from the phenomena observed on dissection, whether this local violence has produced death from suffocation, which, as is well known, it was well fitted to do, or whether this has been occasioned by the pillow in which the head of the deceased was buried, which is all the more probable as the pressure on the neck must have already produced a certain amount of asphyxia."

To complete this tragic case, I may add, that three individuals, one man and two women, tried for complicity in this murder, were, in spite of the strongest circumstantial evidence in favour of their guilt, for want of proof, only sentenced to many years' imprisonment "for reset of stolen goods." *Seven* years afterwards, when this murder seemed to have been long forgotten, government paper, which had belonged to the murdered person, appeared in England, and the seller was —— the brother of the man condemned!

CASE CCLXXXVIII.—DOUBTFUL SUICIDE BY WOUND OF THE PERICARDIUM AND HANGING.

An unmarried woman, aged 34, well known to be melancholic, and living in unhappy circumstances, was found hanged at the window of her room, the door of which was bolted in the inside. Although these circumstances evidently betokened suicide, it was, nevertheless, somewhat staggering to find two wounds on the thorax of the body, a basin with bloody water on the table, and near it a bloody sponge. A medico-legal examination of the body was ordered, for the purpose of dispelling the uncertainty thus occasioned. The wounds, which ran from above downwards on the left side of the thorax, penetrated between the seventh and eighth ribs, and had clean unecchymosed edges. Corresponding with them there was in the pericardium also two wounds of almost precisely the same size, that is, three-quarters of an inch in length, sharp-edged, and unecchymosed; there was no unusual effusion into the pericardial sac. At the apex of the thin layer of fat which covered the heart, there was a distinct clean cut through it one-quarter of an inch long. How little was wanting to have ensured the speediest death! This had not been, however, caused by the wounds, but by hanging. The mark of the cord, which was as usual of a dirty yellowish-brown colour, cut like parchment. and was perfectly unecchymosed, ran, with one interruption two inches in length, right round the whole neck. On the left side it was only two lines broad and deep; across the throat it was, however, one-quarter of an inch, and in some places half-an-inch broad, but quite superficial. This condition of the mark was extremely interesting in connection with the implement employed: this was a woollen shawl, consequently soft and broad, but had a tolerably hard and sharp lace border. From the report of the external inspection of the body I may also add, that the tongue lay behind the teeth, that putrefaction was just commencing, that the sexual organs were in their virgin state, and that the right hand was somewhat stained with dried blood. The heart was almost empty of blood, the lungs were healthy and anæmic, the trachea was pale and empty, the blood in the body was also not unusually fluid, there was, therefore, certainly no evidence of death from asphyxia. The brain and its meninges, as well as the sinuses, were also rather anæmic than apoplectically congested. There was nothing unusual in the abdomen. Here then is another case in which strangulation proved fatal by neuroparalysis, in the production of which the whole bodily, as well as the mental condition of the individual, and particularly the precursory dangerous injuries, may have borne their part. We must of course assume it as indubitable that the injuries observed might have been inflicted with the shawl and table-knife laid before us, the latter being sharp and pointed, and stained with blood. But we also had no difficulty in referring the death to *suicide*. The door bolted on the inside, not being an object of medico-legal cognizance, could not by itself be used as proof. The blood on the right hand, however, the direction of the wounds from above downwards, the circumstance that a great preponderance of strength is required forcibly to hang a moderately powerful adult individual, alive and perfectly conscious—not a trace of any such violence having been found, while it could not be assumed that the individual was hanged after death, since although the pericardial wound might have proved fatal, it had not done so,—all justified our opinion. When in answer to a query we stated, that the deceased might, after having inflicted the wounds upon her thorax, very possibly have washed, and then hanged herself, this is unquestionably correct. This case gives a fresh proof of the obstinate determination of suicides.*

CASE CCLXXXIX.—DOUBTFUL SUICIDE BY HANGING.—THE BODY FOUND STANDING ON BOTH FEET.

I append the three following cases, in which the bodies of apparently unquestionable suicides were found *standing on both feet* (*Vide* p. 194, Vol. II.). The workman B., who led a most unhappy life with his wife, aged 43, was said to have found her hanging from the window-bolt on his return home, subsequent to a stormy scene. She *stood with both feet flat* upon the floor and was suspended, her head bent to one side, in a woollen neckcloth tied in a simple knot. The head and face of the body were pale, the eyes did not protrude, the tongue lay between the clenched teeth. Neither upon nor in the clenched hands, nor on any other part of the body, was there any foreign body found or anything else remarkable. Round the neck between the os hyoides and the larynx, leaving, however, the whole of the back part free, there ran a dirty-brownish mark, one-quarter of an inch broad, superficial, leathery, and unecchymosed. The lungs and large venous trunks were turgid with watery blood, and the right side of the heart and the coronary vessels were very full (without being over-distended) with blood. The cranial cavity was not congested, but rather the reverse. Within the abdomen the liver, and particularly the kidneys, were very full of blood; the other phenomena observed were unimportant. We assumed (1.) that the deceased had died from apoplexy of the lungs, (2.) that this had been occasioned by strangulation, and (3.) that the dissection by itself could not answer the question respecting murder or suicide with any certainty, but that it revealed nothing inconsistent with the idea of suicide. We dared not say more. For the case was a most unusual one, and no such great preponderance of force on the part of a third party was requisite in this case as in that of a person actually suspended (in the air). It must ever remain doubtful, whether the husband, well known as a brute, had not forcibly *crushed* his feebler wife against the window, and when thus fixed against the window-frame rapidly fastened her neckerchief to the bolt.

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* In the Scientific Commission for Medical Affairs, a case came before us for our *super arbitrium*, in which a young woman first murdered her child, and immediately thereafter made *seven* (all unsuccessful!) attempts at suicide, by stabbing, hanging, and strangling.

Case CCXC.—Suicide by Hanging.—The Body found Standing on both Feet.

A man of some position, who for years had led a suspicious life, was most unexpectedly imprisoned for suspected perjury in connection with a large and important money matter. After one or two examinations the case appeared to be growing unfavourable for him; and he was found one morning hanging in his cell. His fellow-prisoner had heard him get up at night, but had thought nothing of it and slept on. The deceased had erected an extemporaneous gallows by placing a small hair-broom across from one wing of a bed-screen to another, the two meeting each other at an acute angle, tying his woollen neckerchief to the handle of the brush and suspending himself in it. He was found standing with both his feet flat upon the floor. He was a powerful man, about forty years of age. There was no trace of erection or seminal ejaculation. His countenance was pale and sunken; the eyes shut, deep sunken, and unecchymosed, the tongue behind the teeth. The mark of the cord was only visible upon the whole of the right side in the perfectly common form we have already so often described, of a mummified depression; on the left side there were but a few traces of it visible. The nape of the neck was not marked at all. The head was hanging forward when the body was found. The body was only inspected. No autopsy was required.

Case CCXCI.—Doubtful Suicide by Hanging.—The Body found Standing on both Feet.

The host of a beer-house was found hanged (in March), standing upon both feet. I do not know what were the circumstances which gave rise to the suspicion of the guilt of a third party, but a medico-legal examination of the body was ordered. On the middle of the larynx there was a dirty brown, parchment-like, and perfectly unecchymosed mark of a cord, two lines and a-half broad, and one line deep, which ran almost completely round the neck, and was lost at each side of the occipital protuberance. *One inch* beneath that, however, I found, what is quite unusual, a faint, pale-bluish depression, two lines broad and scarcely one line deep, quite soft and unecchymosed, which commenced at the left border of the trachea, and extended for two inches and a-half over the right side of the neck. The dissection revealed hyperæmia of the lungs and brain. The pulmonary artery was still hyperæmic, but not the heart. The only thing remarkable in the abdomen was the tolerably congested condition of the vena cava. We assumed—(1.) That death had been caused by apoplexy of the lungs and brain; (2.) That death had been produced by strangulation; (3.) That this had been produced by the ligature which had lain in the upper mark; and (4.) That it is not possible to determine whether the inferior mark has been produced by the same ligature,—perhaps by an earlier unsuccessful attempt at suicide,—or whether it has been produced in any way after death; (5.) That, nevertheless, the examination of the body has not brought anything to light which could justify the supposition that the death has been caused by a third party. The case was accordingly not further investigated.

CHAPTER VI.

DEATH FROM DROWNING.

§ 53. GENERAL.

A MAN is said to be drowned when the access of the atmospheric air is cut off from the air-passages by any watery or pultaceous fluid into which his head has fallen and remained. It is not necessary that the whole body, or even the whole head, should be submerged in the fatal fluid. A man whose head alone is submerged, and who cannot withdraw it from the fluid, can and must drown; and the like is true of the face alone. Thus, an individual may be drowned in perfectly shallow brooks, or gutters, particularly in the case of new-born children, intoxicated or epileptic persons; or this death may follow immersion in the most trifling quantity of fluid, as in the case of new-born children drowned in shallow vessels in which there has been a small quantity of blood, urine, or liquor amnii, not a few of which have occurred to me. It is not, however, necessary that the fluid should be absolutely watery, as death may follow submersion in the pultaceous fluids of marshes, cesspools, and the like. In all these cases a negative poisoning of the blood ensues, since the blood, suddenly deprived of the influence of the oxygen of the atmosphere, becomes unfit to vivify and enable the nervous system to perform its functions (§ 39). Hence it follows that, physiologically considered, death from drowning is to be regarded as identical with death from asphyxia or strangling; and this explains the fact, that the physiological results of the dissection of those drowned differ in no respect from those just related in the foregoing chapters, as the result of the kinds of death just named. Consequently those drowned may die (*Vid.* § 44, p. 160, Vol. II.) in one of four ways, viz., from cerebral hyperæmia (apoplexy), from pulmonary hyperæmia (asphyxia), from both of these combined, or from neuroparalysis. It was reserved for the scepticism of modern authors on medical jurisprudence to lay down the dogma, that a man may fall alive into the water and die there without being drowned, as when he receives a fatal injury by falling with his head upon a stake or rock, &c.! But when a man in falling into the water receives a fatal cranial injury whereof he dies before he drowns, then is he certainly not drowned, but has fallen dead into the water, and is medico-legally to be regarded as a body thrown into the water. Has he, however, not been instantaneously killed by the injuries received, but fallen alive into the water, then he has been drowned, and is to be treated in every case as a man who has been injured shortly before being drowned (*Vid.* § 57). Individual cases may certainly present difficulties in regard to this question, but each case must be decided according to circumstances and on its own merits.

Of all the four kinds of death that may happen to those drowned, that from cerebral hyperæmia is the rarest. That this kind of death never occurs in such cases, I cannot agree to, but still less that it is the most frequent. The protocols of the dissections of inexperienced medical men are certainly not to be trusted in regard to this, since there is no other appearance in which self-deception is of such easy and frequent occurrence. If any one will take the trouble (as I have done) to compare the histories of hundreds of dissections of those drowned, as related in original reports or in medical periodicals, he will not wonder at "apoplexy" being said to be not a rare, but a perfectly common cause of death in those drowned. For, on the one hand, the more or less visible congestion of the sinuses and veins of the *pia mater* posteriorly, and (where the body rests on its back) inferiorly, which is of daily occurrence in every body, cerebral hypostasis to wit (*Vid.* Gen. Div., § 9, p. 21, Vol. I.), is very frequently confounded with apoplexy, with which, as it is a purely cadaveric phenomenon, it has no connection whatever. And, on the other hand, many medical men in cases where the results of the dissection are purely negative, as happens in every case of death from neuroparalysis and in many others, eagerly grasp at any supposititious congestion of the cerebral veins or sinuses on which to base a positive opinion as to the cause of death, whilst a more extended acquaintance with the appearances found in other bodies would show that there was actually nothing anormal in the phenomena before them. Moreover, it is evident, that individual opinion, or I might say, the eye of each individual medical man, must have a direct influence in regard to the value to be attached to the appearances discovered in such cases, since there is nothing more relative than the degree of congestion of the cerebral veins and sinuses; nothing more indefinite than the expressions, "much," "considerably," or "moderately congested," and the like, and no means can be devised to rectify this difficulty. I have instituted a series of experiments in regard to the weights of the cerebrum and cerebellum, certainly without any great hope of any particular result, since it was evident on the one hand, that the very various corporeal and mental conditions of the different individuals, and on the other, the relatively trifling excess of weight of blood—which might suffice to produce fatal hyperæmia—would be enough to prevent the attainment of any even comparatively satisfactory result, and these experiments have been so thoroughly fruitless that I very soon gave them up.[*] It is, however, certain that even in those rare cases of drowning in which cerebral hyperæmia is found to be the only positive cadaveric phenomenon, except one other special appearance, to be mentioned farther on, and must, therefore, be recognised as the cause of death, this hyperæmia is always relatively inconsiderable, and actual hæmorrhage is the rarest of phenomena, and is only observed under very peculiar circumstances. Thus I have observed this apoplectic hæmorrhage in the body of a man drowned by falling into a swamp while drunk. The muddy fluid of the marsh was found in the trachea, and all the other usual signs of death from drowning were observed in the body. The meninges were turgid with blood, and beneath the *dura mater* there was an extravasation the diameter of an inch.

Death from hyperæmia of the thoracic organs and death from paralysis are *of almost equal frequency* in cases of drowning. Of course, here as well as everywhere else, I speak only in reference to perfectly fresh bodies. Why A. should die in the water from apoplexy, B. from suffocation, and C. from neuroparalysis, &c., it is impossible to say with any certainty. Individual bodily tendencies, differences in the temperature of the water, unconsciousness, drunkenness, fright at falling into the water, the struggle against the element or voluntary or involuntary passiveness while sinking, and other circumstances of this nature have indubitably some influence in this respect. Nothing definite in regard to this case can, however, be laid down, but this is of no practical importance, since our diagnosis must be strictly based upon those cadaveric phenomena, however various, which experience has taught to be diagnostic of death having taken place in the water. But besides those general phenomena just referred to, which are dependant upon the respective physiological cause of death, the actual cause, drowning, just as well as the actual cause of the analogous kind of death in the case of suffocation or strangulation, has its special and peculiar effects which must be considered along with the more general phenomena in order to determine the diagnosis.

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[*] As an example, I subjoin the following results in the case of light bodies, all males, and all dead from hanging:—

A male aged 25 years, weight of brain about 3 lbs. 3 oz. (imp.)
A male aged 18 years, weight of brain about 3 lbs.
A male aged 50 years, weight of brain about 2 lbs. 11 oz.
A male aged 40 years, weight of brain about 3 lbs. 8¼ oz.
A male aged 32 years, weight of brain about 3 lbs. 4 oz.
A male aged 40 years, weight of brain about 3 lbs. 7 oz.
A male aged 50 years, weight of brain about 3 lbs. 3¾ oz.
A male aged 28 years, weight of brain about 2 lbs.

How great the variations under tolerably uniform conditions!

§ 54. Diagnosis. (*a*) The External Appearances.

In the case of every unknown body taken out of the water, two questions present themselves:—Was the deceased alive or dead when he fell into the water? and has death occurred by accident, suicide, or the fault of a third party? In regard to the first, it is always to be presumed that the individual was alive when he fell into the water. It is true that water is not only useful in carrying away useless and burdensome articles, as rubbish, refuse, excrement, empty chests, boxes, &c., the refuse of some robbery, but even dead bodies also, particularly those of new-born children, are often thrown in, in order to dispose of them in a cheap and convenient manner, or to conceal a crime. But by far the largest number of cases in every place consists of those who have fallen alive into the water. For, as is well known, no form of fatal accident happens so easily as drowning, in bathing, sailing, inundations, passing over bridges or gangways, in fishing, or among dyers, washerwomen, tanners, and those engaged about water-works of various kinds, &c.; while it is equally well known that, next to hanging, voluntary drowning is the form of death most affected by suicides, particularly in summer. In opposition to the overwhelming majority of individuals who thus fall alive into the water, the instances of dead bodies, particularly of adults, flung into the water, form but a small minority, the *prima facie* presumption in favour of the former supposition is therefore almost always justified. In any doubtful case, however, this presumption is, of course, not sufficient, and the body must be examined, in order that the medical jurist may ascertain its certainty, or at least that amount of certainty which the peculiarities of each individual case is fitted to afford. From the fact that there is no infallible and constant sign, that is no diagnostic symptom, which is never wanting in the body of one drowned, and which belongs exclusively to death from drowning, a great many authors on the subject have endeavoured to represent the difficulties in the way of deciding a doubtful case of death from drowning as so manifold and insurmountable, that a novice must be reduced to despair when, after such a warning, he is requested to deliver an opinion in such a case. Difficult and complicated cases undoubtedly frequently occur; but the more numerous the cases of death from drowning I have examined in the course of years, the more am I convinced *that the difficulties in the way of deciding the fact of death from drowning have been very much overrated*, and I do not hesitate to accept as correct the statement of the practically experienced Devergie, when he says,* that he could, with a clear conscience, in nine-tenths of all cases declare whether the submersion had taken place during life or after death. Of course we must here also consider the symptoms in their entirety, and carefully reflect whether the negative worth of one or more of these surpasses the positive worth of others, or the reverse.

Scarce any other kind of violent death has found such a host of investigators as death from drowning; and of course in the case of no other is there such a difference in regard to data and opinions. I should only increase this uncertainty, unless I held fast to the great object of this book, that is, having all needful regard to the data of the best authors, chiefly and specially to decide in accordance with my own observations, and to express what the observation of nature has taught me. I have made no experiments on animals in regard to death by drowning; all that could be thus ascertained seemed to me to be attained by the instructive experiments of Piorry, Orfila, Albert, Riedel, Maier, Löffler, Kanzler, and others, which have afforded much interesting information, although, in regard to making use of it in medico-legal practice, it must never be forgotten that to draw conclusions in regard to men from results obtained on animals is, in forensic medicine, always and in every case rash and hazardous. I now go on to describe the external phenomena apparent on inspection of the body:—

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* *Op. cit.*, II., p. 351.

1. *Coldness of the body.*—The supposition that the bodies of those drowned feel specially cold when touched, which was first stated by the former legal physician of Berlin, Mertzdorf, has been recently again advanced by Siebenhaar.* So long as a relative idea like this cannot be determined by the thermometer, just so long is far too much room given for the play of subjective opinion in each individual medical jurist, for any value to be placed upon this symptom.

2. *Remarkable paleness of the body.*—I have never observed any peculiar paleness in those drowned. Indeed, it is often extremely difficult to determine which of several bodies lying side by side is paler than the others; and this is, of course, still more difficult when only one body is on view at once. One is easily deceived, however, when a preconceived idea is firmly entertained.

3. *The countenance* of those bodies recently drowned, which have been quickly taken out of the water and shortly thereafter inspected, is pale, in most cases not swollen, the eyes shut, and when asphyxia has been the cause of death, there is commonly froth over the mouth. But if the body have been in the water some time, that is, two or three days in summer, and in winter eight or ten, then the countenance is no longer pale, but rather reddish or bluish-red—the first commencement of putrefaction—which in bodies floating in the water follows quite a different course from that usual in other circumstances (*Vid.* § 58).

4. *Prolapse or incarceration of the tongue* is a sign so perfectly inconstant as to be utterly valueless. The tongue is just as often found behind the jaws as between them (§ 41, Special Div., p. 130).

5. *Goose-skin—cutis anserina*—is a symptom always worthy of attention; and every body ought to be carefully examined for it, particularly on the anterior surface of the extremities, the part where it is most commonly found. It is hardly ever absent, even in summer, in the case of any one actually drowned, always supposing, of course, that the body be inspected before the putrefactive process have completely disfigured the cuticular surface, or actually removed the cuticle. Nevertheless, of itself the cutis anserina is very far from being a diagnostic sign of death from drowning. Since I have already pointed out that in individuals of "firm fibre," particularly

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* Encyclop. Handb. der ger. Arzneik, I., s. 434.

in those of the lower classes who have a thick firm skin, not much attended to during life, it has, while they are yet alive (as any one can readily satisfy himself by examination), as well as after death, a granular appearance, not to be distinguished from that termed cutis anserina. And to this there is still another fact to be added, the absolute truth of which I have learned by the continuous observation of the bodies of those who have died a violent death, namely, that after *every* kind of suicide, shooting, hanging, stabbing, &c., as well as after every kind of accidental violent death in healthy men, as by falls, &c., cutis anserina is very frequently found, and is just as granular and well marked as ever it is after death from drowning; and of this an inspection of almost any body of the kind described will be sufficient to convince one. The cause of this appearance is undoubtedly, as has been generally correctly recognised, the mental shock experienced at the moment of the accidental or suicidal death, and that to this mental shock, even more than to the coldness of the water, is owing the presence of the cutis anserina in those drowned, is proved by the fact that the temperature of the water has no influence in its production, since it is found in those drowned in the heat of summer, when the water is of a very high temperature, precisely the same as in the greatest cold of winter.

6. *The condition of the hands and feet.*—When a body has lain in water from twelve to twenty-four hours, alike in winter as in summer, and seldom much earlier, the hands and feet begin to assume a livid greyish-blue colour. After the lapse of two or three days, the colour has become more of a greyish-blue, and contrasts very strongly with the colour of the rest of the body. Simultaneously with this change of colour, the skin of the hands and feet have become corrugated in longitudinal folds, and now resemble very much the cyanotic limbs of an asphyxiated cholera patient.* I shall relate the other changes farther on, when I come to describe the course of putrefaction in those drowned (§ 58). The diagnostic value of this so-called "cholera-hand" in the case of bodies found in the water is, however, *nil*, as the appearance is a purely cadaveric phenomenon; of course, since it does not commence to form till after twelve to twenty-four hours soaking in the water, and long before this the man has become a corpse. No corrugation or discoloration of the skin of the hands or feet is ever observed on the body of any

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* *Vid.* the representation, Plate III., Fig. 8.

one drowned who has been taken out of the water within half-an-hour, within two, six, or even eight hours. On the other hand, I have abundantly often completely produced this appearance by laying bodies in water, or by merely wrapping their hands in cloths kept constantly wet for a few days. This appearance then, particularly in its later developments, proves only, that the body on which it is observed, should the place where it has originally been found be previously unknown, must have lain in water; but it by no means proves whether it was alive or dead when it got into the water. But even in this respect this appearance may afford the Judge valuable information. Because,—and I myself have had a case in point,—thieves may draw out of the water the body of a person drowned and lying near the bank, and plunder it; in doing this they may by rough usage injure the body, which is then left lying, so that the case may thus appear as if the deceased had been robbed and murdered. But at once on approaching the body, and observing that condition of the skin of the hands and feet just described, we shall and can declare our conviction, that it must have lain some considerable time in the water as a corpse, and further investigation will then bring to light the other particulars.

7. *Sand, gravel, mud, &c., under the finger-nails of the body.*—These appearances are not found, even on the closest inspection, in most of those drowned, and are only observed in those who in sinking have reached the bottom, and there, or on the banks, or on the sides of ships or rafts, &c., made long-continued exertions to save themselves. The appearance is of importance, since it is not to be supposed that any murderer would take the time and trouble to give the body the appearance of one drowned after a fashion so difficult of imitation. But, on the other hand, it is possible that sand, &c., may get under the nails of a body while it is being dragged from the water. The absence of this appearance is, however, for the reasons given, of not the slightest importance in regard to the diagnosis of death from drowning.

8. In my "Gerichtlichen Leichenöffnungen"* I have directed attention to another and a novel sign of death from actual drowning, I mean *the contraction of the penis* in men who have fallen into the water alive, and therein been drowned. I have almost never failed to find this appearance in recent bodies of this character, and on the

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* Gerichtl. Leichenöffn., s. 118.

other hand, have not observed anything similar so constantly after any other kind of death. Even in men of the most colossal proportions the penis is found short and contracted, and even the subsequent putrefactive distention does not prevent the longitudinal shortness of the organ from being distinctly observed. Brettner* has with considerable acumen referred this remarkable phenomenon to a similar origin with the cutis anserina. "Bundles of unstriped muscular fibres," he says, "lying in the upper stratum of the true skin, surround the sebaceous glands, and force them forwards by their contraction, thus making the cutis anserina. Precisely similar unstriped muscles are found in the subcutaneous cellular tissue of the penis; they run principally parallel to the long axis of the member, but very often large bundles run across it. (Kölliker). It might therefore be expected that their contraction would compress the spongy tissues of the penis, which are capable of little resistance, and thus reduce its dimensions in breadth, thickness, but particularly, from their principal direction, in length, and thus produce what may be shortly termed a 'contraction' of the penis, and further that irritants capable of exciting the contraction of ordinary unstriped muscles might also be capable of inducing the contraction of these unstriped muscles of the penis, *e.g.*, cold and fright."

§ 55. CONTINUATION.—(*b*) THE INTERNAL APPEARANCES.

9. *Cerebral hyperæmia.*—I have already given ample details respecting this phenomenon (§ 53, p. 230, Vol. II.). Its absence is the rule in those actually drowned, and can never prove the contrary. Moreover, advanced putrefaction causes it to disappear even where it was originally present, and in this condition of course are an overwhelming majority of those bodies which have lain a considerable time in the water, and are consequently not brought under the notice of the medical jurist till long after death.

10. *Upright position of the epiglottis.*—Kanzler's experiments on animals have proved that when they are dissected previous to the commencement of putrefaction, the epiglottis always stands erect, whether the animals have been drowned, or killed in any other manner. As already stated, I have never experimented on animals. In regard to men the position of the epiglottis is of no diagnostic value. Both the

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* Casper's Vierteljahrschrift, 1855, VII., s. 159.

erect position and the opposite have been equally often supposed to have been observed after death from drowning, and correctly so, for both positions are actually observed in the body, but perfectly independent of the nature of the death, produced and modified by the manipulation of the body and its neck in laying open the trachea and larynx.

11. *Vascular injection of the tracheal mucous membrane, and the existence of mucous froth in the trachea.*—I have already given full details respecting this most important appearance in those suffocated, and particularly in those drowned (§ 40, p. 128, Vol. II.). In the recent bodies of those who have been *suffocated* by drowning, we find, besides the cinnabar-red vascular injection of the tracheal mucous membrane, sometimes only a few isolated, white, but very distinct, small pearl-like bubbles; sometimes a much greater quantity of froth, which is generally white, and more rarely bloody, and sometimes the whole tracheal canal is completely filled with this finely vesicular white foam. This extends into the bronchi, or rather, extends out from them and their ramifications, as is distinctly evinced by exerting strong pressure on the as yet untouched lungs, when this froth will be seen to ascend into the opened trachea, even in those cases in which little or none of it had been originally found there. Devergie states that this froth can only be found in the trachea when the person in drowning has been able to get his head above water, and thus inhale atmospheric air; but numerous observations, all clear and decided, enable me to declare positively that this opinion is erroneous. Even in the case of men who were well known to have gone at once beneath ships or logs of wood, the instant they fell into the water, and who never came again to the surface alive; in that of others who had loaded themselves with heavy stones for the purpose of sinking themselves at once, and who seemed to have necessarily attained their object, I have found this appearance in the trachea precisely the same as in those other cases in which a repeated emergence above the surface of the water, though not positively known, might yet have been supposed to have taken place. At all events, since this froth is the product of the mixture of the inhaled fluid, in which the drowning has occurred, of the natural mucus of the passages, or even of blood from some ruptured vessel with the air contained in the lungs and trachea, and caused by the final forcible respiratory movements, it must be regarded as an indubitable sign of vital reaction, that is, that life must be regarded as having existed

at the period of its formation. It is, however, certainly *possible* that the individual may have been suffocated in some other manner, tracheal froth being produced in this mode of death also (§ 40), and then thrown as a corpse into the water. But besides that such an accidental occurrence could certainly only occur in the very rarest instances, and could not be presumed to exist in ordinary cases, the other signs of death from suffocation would still remain to be considered and would throw light on the case. Alas! this most exquisite sign disappears during putrefaction, and if that be in any degree advanced, both trachea and bronchi are found quite empty. Some support, at least, for the judgment in such cases, which are so frequent, will be found in the putrefactive coloration of the tracheal mucous membrane, which is then necessarily present and evident, since, as I have already remarked (p. 44, Vol. I.), this occurs comparatively rapidly, is one of the earliest of the phenomena of putrefaction, and is easily recognisable by the cherry-brown redness of the whole of the inner surface of the larynx and trachea.

12. *The various degrees of arching of the diaphragm,* which is at one time found pushed high into the thorax, and at others just as much depressed, have been commended for consideration. But a symptom like this, which depends entirely upon putrefaction, can afford the practitioner no diagnostic information whatever. The further the putrefaction is advanced, the more the stomach and intestines are distended with gas, the higher is the diaphragm forced up, and the reverse.

13. *The increased volume of the lungs.*—The lungs in the more or less recent bodies of those drowned at every period of age present an appearance so peculiar as to be truly thanatognomonic, and this never fails, except in the rarest instances, where putrefaction of the whole body and of every organ is already far advanced. It consists in a complete distention of the chest by the lungs, which press close to the ribs, and almost completely cover the heart; they appear to be inflated like a balloon, and are not like ordinary healthy lungs, tolerably firm and crepitating, but feel exactly like a sponge. A similar condition is not found so constantly after any other kind of death, excepting only the most acute œdema of the lungs, which however is not present in this case, and, occasionally, after suffocation in irrespirable gases. This distention of the lungs is in part an actual hyperæria, in consequence of the most violent inspiratory acts carried on at the momentary emergences of the head of the drowning

person above the surface of the water, but partly and chiefly a consequence of the inhalation of the fluid in which drowning has occurred into the lungs, as has been indubitably proved by experimenting on animals with coloured fluids, and by my own experience in regard to specific fluids. When the lungs are incised there is a copious outflow of sero-sanguinolent froth. Though in the controversial writings regarding death from drowning, it has been maintained on the one hand, on the ground of experiments on animals (by Daniel, Morgagni, de Haen, Metzger, Orfila, &c.), and controverted on the other, on the same ground (by Goodwyn, Haller, Maier, Wistrand, Albert, &c.), that water can also get into the air-passages *after* death, or finally, that it can only then be introduced by means of artificial contrivances (Löffler, Riedel, Kanzler), yet there is a criterion which makes this controversy only interesting in a scientific point of view, and of no importance practically, I mean the *frothy* condition of the fluid found in the lungs and throughout the air-passages, which, under no conditions, can be produced in the dead body, not even by artificial means, as injections, &c., since it is the product of the forcible respiratory struggles of the individual while dying (p. 238, Vol. II.). The fact, proved by experiment beyond the possibility of a doubt, that the increased volume of the lungs does not exclusively depend upon mere hyperæmia, explains why this condition of the lungs is found even in those cases of drowning where death has been caused, not by asphyxia, but by neuroparalysis, and this adds very much to the value of this most important appearance. I have already stated that this appearance is only destroyed by a very high degree of putrescence, and to this I must add that it still remains perceptible all through the earlier stages of putrefaction, even after the froth in the trachea has quite disappeared, and when the blood has been almost all evaporated. It scarcely requires to be pointed out, that the important probative power possessed by this condition, may be rendered completely infallible, should the fluid in which the individual has been drowned have been something peculiar, as liquid manure, soapy water, urine, &c., and this fluid have again been discovered within the lungs.

14. *Hyperæmia of the right side of the heart,* the left side being wholly, or almost wholly, empty. This is only one of the appearances found after death from asphyxia (§ 40), and only proves this to have been the form of death, but this may have been otherwise produced, and the body subsequently flung into the water. There-

fore, also, it is wanting in all those numerous cases of persons actually drowned, in whom death has not arisen from asphyxia, and particularly in those in whom it has been caused by neuroparalysis; and precisely the same estimation is to be placed upon—

15. *The congestion of the pulmonary artery,* and

16. *The actual hyperæmia of the lungs.*

17. *The remarkable fluidity of the blood* throughout the whole body, which displays a colour similar to that of cherry-juice, is the symptom of all others upon which everyone has always been agreed. This condition of the blood, which is never, and can never be absent in any case of drowning, is readily explained by the fact of the access of the atmospheric oxygen being shut off from the blood, and its coagulability thus lessened. For the very same reason, however, precisely the same kind of blood-poisoning must and does occur (§§ 39, 53) after every other kind of death which ensues in consequence of any hinderance to the entrance of the atmospheric air into the respiratory organs, which is also the case after narcotic poisoning, putrid fevers, and, as is supposed, after a fatal stroke of lightning. The possibility of any other kind of death betokened by this appearance having been the fate of a body taken out of the water, will be at once confirmed or set aside by means of the other diagnostic symptoms present. In regard to a symptom like the present, which never fails to be found in dissecting every body which is quite recent, or at least not putrefied to any considerable extent, it is only again to be regretted that it too perfectly disappears where putrefaction is at all advanced.

The diagnostic appearances found in the abdomen are much fewer than those just mentioned; of these the most important and the one most controverted is:—

18.—*The presence in the stomach of some of the fluid in which the drowning has taken place.*—The first question in regard to this is:—What does the observation of large numbers of bodies of those known to have been actually drowned teach respecting it? It teaches this, that in the greater number of cases more or less water is found in the stomach, from complete distention down to a few tablespoonfuls, and that the stomach is only *very rarely* found perfectly empty in bodies not wholly putrefied, for in these, of course, the water previously existing in the stomach is generally evaporated along with the other fluids. When the finding of this water in the stomach is denied, I believe this depends upon an illusion, which may very readily take place, and to which the attention is only directed after considerable experience; I refer to the circumstance that when, as is so usually the case, the remains of food are found in the stomach, and particularly when these remains are tolerably fluid, it is certainly impossible accurately to determine how much fluid swallowed during the death-struggle may be mixed with them. On the other hand, cases occur very frequently in which, particularly in bodies that have not lain long in the water, the water swallowed may be distinctly seen floating unmixed above the thicker pultaceous mass of food, or where the food is altogether as thin as water, or where water alone is found in the stomach. There is now scarcely any difference of opinion as to the fact, that this water cannot get into the stomach after death, this having been proved by experiments on animals. Riedel * found no trace of fluid in the stomachs of five dead cats flung into the water, nor in those of three children placed under water in a favourable position, and left there for from one to two days; Kanzler † did not find any in the bodies of those animals which he flung into water coloured with ink, even when their mouths were slit back as far as the articulation of the jaws, a cork placed between the two jaws, and the animal so placed in the water that its head and the mouth thus held open should be uppermost. But, on the other hand, in regard to the finding of water in the stomach, the warning is scarcely required, that it must not be too much relied upon, since it is evident that the deceased may possibly have drunk water shortly before his death (*Vid.* Case CCXCII.). Logical deduction, however, forbids us to suppose that in every case a previous accidental draught of water has been taken, since, on that supposition, it would be difficult to explain why water, or the remains of food diluted with water, is not just as often found after every other kind of violent death, as hanging, shooting, and the like, which is by no means the case. When still another "possibility" has been put forward to explain the watery contents of the stomach and destroy their probative value, the supposition, namely, that any third party, to obscure a violent death from any other cause, might have intentionally injected water into the stomach, this is but another —confounding of the desk with the dissecting table! Where in actual life has any such procedure occurred? And ought not such a murderer to be at least an educated physician to be so well acquainted with the symptoms of death from drowning and the use of the stomach pump?! It may happen by a lucky chance that the fluid in which the drowning has occurred has been such as is never voluntarily drank, liquid manure or mud from some swamp, &c., and the smallest quantity of this (*Vid.* Cases LXXIX. and CCCXI.) is then *an irrefragable proof of the actual occurrence of death from drowning,* since this fluid could not have got into a dead stomach, and the swallowing of it must have been a vital act of the individual dying in the water. Only in the case of *new-born children* does this dogma sustain any limitation, but this is one which in doubtful cases deserves the most careful consideration. Thus the fœtus within the membranes not only makes deglutatory movements, but actually swallows, as is indubitably proved by the composition of the meconium, which constantly contains cuticular down and the remains of the vernix caseosa* (§ 77). Foreign bodies such as these getting into the organs of deglutition or respiration, the mouth, nose, or gullet, excite the medulla oblongata to the production of deglutatory movements, without its being of necessity simultaneously excited to respiratory movements. Thus, in the case of successful attempts at resuscitation, titillation of the gullet of those asphyxiated with a feather will often be successful in producing movements of deglutition long before the respiratory movements recommence, and in hybernating animals, in whom the respiration is sometimes reduced to five per cent. of the normal frequency, deglutatory movements are also easily excited. Now, of course, the fœtus within the ovum presents precisely similar conditions after the escape of the other contents, and this explains the fact, by no means rare, that liquor amnii and uterine mucus are often found in the mouth, gullet, and stomach of children which have indubitably been stillborn. But should the fœtus be at birth suddenly and without appreciable interval discharged from the uterine cavity into a watery or pultaceous fluid, it must *à priori* be admitted to be possible that it should make deglutatory movements in such a medium, and actually succeed in introducing portions of it into the fauces, gullet, or stomach, without ever having breathed. And cases are observed, though very rarely, which prove that this possibility does actually occur, that is, that with indubitably fœtal lungs foreign substances are found in the stomach, and therefore their presence there does not involve consequentially, as it would at any other age, that the child had fallen alive (breathing) into the fluid. Cases of this kind occur in practice chiefly where the birth has happened on the night-stool or privy, &c., an event of such frequent occurrence with those who bring forth secretly, that, for example, I myself have every year several instances of it brought before me. In those cases subsequently to be related (Cases CCCXCII.-CCCXCV.), in which we found human ordure in the stomach, the children had also indubitably respired, and therefore, as in every similar case, we were forced to conclude not only that the children had lived, but that they had been actually drowned. In another case, however, where the circumstances attendant on the birth could not be judicially ascertained, we found for the first time this extraordinary appearance. The child, perfectly mature and soiled with ordure as it had been taken from the privy, was laid before us in such a perfectly fresh condition that the appearances on dissection were not in the least obscured. The docimasia pulmonaris revealed a perfectly fœtal condition of the lungs, the diaphragm was situate at the fourth rib, there was not a trace of any preceding pulmonary respiration, and yet in the stomach, besides the usual quantity of gelatinous mucus, there was a pulpy bit of human ordure the size of a bean, and more of it also lay on the mucous membrane of the upper part of the gullet. Märklin* has also lately published a precisely similar case. Moreover, this appearance cannot lead to any material error, provided the docimasia pulmonaris is instituted with double caution in any doubtful case, this will then reveal whether any such appearance in the stomach is to be taken as an additional proof of the child having lived after its birth or not (*Vid.* Case CCCXCV.).

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* Medic. Vereinszeitung, 1847, s. 233.

† Casper's Vierteljahrsschft., II., s. 232.

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* Förster (Wiener Med. Wochenschrift, 1858, No. 32) indeed, considers that the meconium is chiefly composed of the vernix caseosa.

19. *Hyperæmia of the abdominal organs*, especially of the kidneys and vena cava, but also of the liver and mesenteric veins. This, as part of the general symptoms of death from asphyxia, will certainly be found in the case of those drowned as well as of all others who have perished from this form of death; but, on the other hand, it is not found in those who have died in the water from any other physiological cause. It is, therefore, anything but a specific symptom of death from drowning, and even when present it disappears with the advance of putrefaction.

20. *Whether the urinary bladder be full or not* is a perfectly immaterial symptom. It is just as often found full as empty or half-filled in those drowned, and this indisputably depends upon the

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* Casper's Vierteljahrsschrift, 1859, Bd. XVI., s. 26.

chance, whether the deceased had passed urine shortly before falling into the water or not. Devergie seems to place some value on the discovery of bloody urine, though he himself describes it as "rare," and says, he has seen it also in those hanged; I myself, however, have never observed it in one single case, either of those drowned or those hanged.

I think that I have shown in the course of the foregoing paragraphs, that, by carefully considering in their totality the diagnostic proofs of death from drowning, as actually observed in nature, and setting aside all that subtle scepticism whose ultimate object is mere negation, it is by no means the most difficult task that a medical jurist has to discharge to determine whether or no a man has fallen alive into the water and been drowned. In making this statement, of course I presuppose that the bodies to be examined are such as, from being not too far advanced in putrefaction, can supply demonstrative evidence on dissection.

§ 56. Illustrative Cases.

Case CCXCII.—Neuroparalytic Death from Drowning.—Water which had been drunk in the Stomach.

A boy, aged two years, playing beside his nurse, on the banks of a mill-stream in the midst of summer, fell into the water and was immediately taken out dead. At dissection, the amount of blood in the brain was perfectly normal; there was no water in the trachea or bronchi, although the epiglottis was open; the lungs were anæmic and all the cardiac cavities were perfectly void of blood. The blood was unusually fluid and of a cherry-red. The stomach was almost completely full of water, this alone, however, did not make the case interesting, but the certainty attainable regarding the origin of this appearance; for the child had been thirsty, and had greedily drunk up a glass of water brought from a neighbouring spring by the nurse; shortly thereafter, the nurse went away for an instant, and on her return she found the child had fallen into the water and been drowned!

Cases CCXCIII. to CCXCVI.—Murder of Four Children of one Family by Drowning.—Neuroparalysis.

It would be foolish to wish to deny that the most hideous crimes

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are fraught with most precious instruction for the medical jurist. In this case we had as it were before us *four experiments made on living human beings* in regard to death from drowning, in so far as we knew that we had here to examine the bodies of individuals in tolerably similar conditions, all of them children, all of one family, all healthy, and flung into the same water, therefore at quite the same temperature, at the same instant of time, and at least three of them taken out of it at the same time. The cold and unfeeling father, who when brought forward to recognise the children killed by himself, displayed scarcely a trace of an awakened conscience, from the very first up to the time of his execution, never for one instant denied the deed, and his confession was confirmed by his (innocent) wife. All this coincides in justifying the supposition that a similar parallel case was perhaps never previously observed, and that it must be looked upon as a positive study in regard to the science of death from drowning.

In November, 18—, the lithographer Biermann took his own four children, born in lawful wedlock, from home in a basket, and flung them into the new canal. Three of them were taken out shortly after, but the fourth and oldest was not found till four months after. They were all dissected by us. The following are the most important appearances found.

a. PAUL, four years old. This body had been only one single hour in the water. The tongue is not swollen, and its tip is between the clenched teeth; the body is perfectly fresh, and not a trace of cutis anserina to be seen anywhere. The fingers and toes are of a bluish colour, but the skin covering them is not corrugated (of course from the short time the body remained in the water). The vascular meninges, the brain itself, and the sinuses contain only a very moderate (normal) amount of blood. The lungs distend the thorax, are of a pale colour and only moderately full of blood. The larynx and trachea contain no froth, their mucous membrane is injected of a bright-red. In the larynx there are a few fragments of potato. Pressure on the lungs forces a quantity of bloody water into the trachea. The coronary vessels of the heart are moderately congested; the right side of the heart contains a teaspoonful of coagulated blood, the left is empty. The pulmonary artery contains no unusual quantity of blood, the blood is quite fluid. A quantity of semifluid food escaped from the gullet. The stomach is unusually large and rather soft; it is quite filled with water and semifluid food-pulp.

The liver is tolerably congested. The intestines are of a normal colour and contain solid fæces. Spleen and kidneys are perfectly normal. The urinary bladder contains half-a-teaspoonful of urine, The vena cava ascendens is only moderately filled.

b. HERRMAN, two years old, had remained *fifteen hours* in the water. The countenance and the whole body are pale and without a trace of putrefaction. The tongue is not swollen, its point incarcerated between the teeth. No trace of cutis anserina. The skin of the feet is corrugated, that of the hands is not so. The meninges, brain, and sinuses contain but little blood. The lungs completely fill the thorax, are pale-coloured, and contain but little blood. The larynx and trachea are perfectly pale and empty; pressure on the lungs forces into the trachea a quantity of very watery blood. The gullet contains semifluid food-pap. The coronary vessels of the heart are moderately full of blood, and both sides of it contain a small quantity of very fluid blood. The large thoracic vessels contain an unusual amount of blood. The stomach is pale and distended with pure water and the remains of food. The liver is moderately congested; the intestines are pale and contain fæces. The spleen and kidneys are not congested. The urinary bladder is empty. The vena cava contains a normal quantity of the blood described.

c. GEORGE, aged one year and three months. The tongue is not swollen, and lies behind the jaws. This body, which had lain *seventeen hours* in the water, already displays greenish stains on the abdominal coverings, and the head is reddish coloured. There is not a trace of cutis anserina on the whole body. Faint longitudinal corrugations of the skin are visible on the hands, and less so on the feet. Within the cranium there is positive anæmia; the meninges are very pale; the brain and the sinuses are almost empty of blood. The lungs press upon the ribs, and they are increased in volume, as in both the older children; they are pale in colour, anæmic, and, on incision, give vent to much watery froth, which can also be pressed into the trachea, which, as also the larynx, is pale and empty. The gullet is also empty. The stomach is pale, and distended with a yellowish fluid and the remains of food. The intestines are pale, and contain fæces. The liver, spleen, and kidneys display nothing remarkable, and, least of all, any peculiar amount of congestion. The urinary bladder is empty. The vena cava contains a small amount of dark-coloured fluid blood.

d. LOUISA, aged six years. The body of this child floated far away, and was not found till the 5th of March, having thus been in the water exactly *three months and twenty-eight days*, and to this I must add, that the winter was one of the most severe and continuous cold that we have had for ten years. This explains the *comparatively* low degree of putrefaction attained, considering the long period elapsed, for the colour of the body was only of a greyish-green, though the epidermis was almost all peeled off, and those internal organs which putrefy early were already affected. The eyes, of course, could be no longer recognised; the brain was reduced to a greyish pulp; all the organs were anæmic, and the vessels empty of blood. The point of the tongue was prolapsed; the hands and feet were grey and corrugated. The lungs were pale, very anæmic, contained much watery froth, and *still* completely distended the thorax. The larynx and trachea were empty, and the mucous membrane covering them had the chocolate-brown colour of putrefaction. The heart was very flabby, and still contained in both its cavities, but chiefly in the right, some very dark greasy blood. The gullet was empty. The stomach, coloured of a reddish-brown by putrefaction, contained a large quantity of almost watery food-pulp. The liver, kidneys, spleen, and vena cava were anæmic. The intestines were coloured of a bright-red by putrefaction, and were empty. The urinary bladder was also quite empty.

Case CCXCVII.—Suicidal Drowning.—Death from Neuro-paralysis.

The dissection of a girl, aged nineteen, took place in the end of April, and presented several points of interest. The body could only have lain a short time in the water, since, except a few livid stains on the face, it was not in the least discoloured, and the hands and feet were scarcely at all macerated. On the upper part of the body and the extremities there was cutis anserina. The tongue was incarcerated between the teeth. The hymen existed. The stomach was unusually large, contained some pulpy remains of food, and was quite distended with water, the quantity of which was so great, that a girl of her age could scarcely have drunk it at once. The kidneys were not congested. The vena cava ascendens, throughout its whole length, was filled with *many fibrous blood-coagula*, and contained not drop of fluid blood. The lungs were not much distended, and were ale reddish-grey colour; little blood, but much water, escaped on incising them. Both sides of the heart contained much coagulated blood. The trachea was pale, contained a tolerable quantity of white froth, and pressure on the lungs forced into it much pure water and froth. Besides displaying many obvious unusual appearances, this case affords a further proof of the possibility of the coagulation of the blood after death, as we have already described. (*Vid.* Gen. Div., § 11, p. 23, Vol. I.)

CASE CCXCVIII.—SUICIDAL DROWNING.—DEATH FROM NEUROPARALYSIS.

A man, aged twenty years, was well known to have been drowned (in November), but the body had lain scarcely twenty-four hours in the water. It was certainly remarkable to find the cadaveric rigidity still persisting at the time of the dissection on the sixth day after death, and also to observe the complete absence of the cutis anserina, in spite of the low temperature of the water in November. The condition of the stomach was also very distinctly marked; it contained no remains of food, and was quite filled with pure clear water. As to the rest of the appearances on dissection, they were in this case once more purely negative: in particular, the brain and its sinuses contained only a moderate and normal amount of blood, the trachea was empty and not injected, and pressure on the lungs forced nothing into it, the lungs themselves were of a slate-blue colour, and seemed rather to contain a bright-red froth than to be hyperæmic. Neither the right side of the heart, the large venous trunks, nor the liver nor the kidneys, were hyperæmic. The bladder contained a teaspoonful of clear urine. However the balloon-like distention of the lungs, the cherry-red and very fluid blood, the complete filling of the stomach with clear water, as already related, and the distinct contraction of the penis, permitted us to conclude that death had occurred from drowning, which, as already said, had actually and indubitably been the case.

CASE CCXCIX.—ACCIDENTAL DROWNING.—NEUROPARALYSIS.

Passing over very many cases of drowning which display nothing unusual, I cannot omit to relate the following one, because it was distinctly ascertained that the child, a girl aged three years, had been drowned (in June) through carelessness, and the results of the dissection were once more entirely negative. The cutis anserina was visible on the neck, the abdomen, and on many parts of the thigh. The whole of the body was pale, and quite fresh. The brain contained but little watery blood, and the sinuses were only moderately filled with it. The lungs were not exactly remarkably voluminous; they were very pale and very anæmic. The large thoracic vessels were almost empty, as were also all the cavities of the heart. The trachea and larynx were pale, and quite empty. The stomach was filled with a thick pultaceous mass of food, in which at least no water could be distinguished. The liver was tolerably congested; the vena cava was, however, only moderately filled. The urinary bladder was empty, and the rest of the organs perfectly normal.

CASE CCC.—MURDER OF A CHILD BY DROWNING.—CEREBRAL HYPERÆMIA.

On the 16th of August, 18—, the body of a child was found lying in a pond in the Thiergarten, with its back above the surface, but its head beneath the water. The child was naked, *but its head was enveloped in a coloured kerchief*, which was tied so tightly beneath the chin, that a mark of strangulation was actually visible on the neck. The mother was ascertained to be the unmarried woman, E., but she denied all knowledge of the death of her child, and asserted she had lost it in the streets. The child was two years and a-half old. The tongue lay between the teeth. The body was of the usual corpse-colour; there was a very evident cutis anserina over the whole of the right side of the body and on the left thigh. The dura and pia mater, the brain-substance, and all the sinuses, were very full of blood, and the latter quite distended with very dark and fluid blood. There was no hyperæmia of any of the thoracic organs; the lungs, which completely filled the thorax, were rather pale than dark-coloured, and contained only a tolerable amount of dark fluid blood. The jugular veins and the large thoracic vessels were in a similar condition, whilst the right side of the heart contained only half-a-teaspoonful, and the left only a few drops of blood. In this case it was to be expected that the larynx and trachea would be quite empty and normal, and such was the case. The liver and the kidneys were only moderately full of blood, while the vena cava was quite stuffed. The urinary bladder was empty. The rest of the abdominal organs presented nothing remarkable.

The stomach was healthy, and almost quite filled with potato-soup. Water, which might have been drunk while drowning, was not to be expected to be found in this case, since the whole head of the child was so enveloped as completely to prevent the possibility of its introducing water into the stomach by swallowing while beneath the surface. (By and by [Case CCCXIV.], I shall have to relate the case of another body, also taken out of the water with its head rolled up.) It is so indubitably evident that the child died from apoplexy and not from asphyxia, that we need not now enlarge upon the subject.

In our reasoned report, when we had come to the consideration of the query, Has this apoplexy arisen in the water? that is, in other words, Has this child fallen alive into the water? after first pointing out to the Judge, that those drowned do die from apoplexy, though much more rarely than from asphyxia, we continued:—"Now it is very well known that apoplexy may occur suddenly even in a state of perfect health, and the child of the accused may have died suddenly of apoplexy, and been cast a corpse into the water. Granting the possibility of all this, there are, however, strong reasons for denying its probability. The child up to the moment of its disappearance was perfectly healthy, running about, and had gone out with the accused; and, under these circumstances, particularly in the case of a child two years and a-half old, the sudden occurrence of fatal apoplexy must be an extremely rare event. In such a case, also, it would be impossible to explain why the head of the *corpse* should be rolled up before it was cast into the water, while it is very probable to suppose that the culprit, when she determined to throw her child yet *alive* into the water, sought to make the deed less terrible by enveloping its head in the kerchief. The fluidity of the blood, however, and partly also the cutis anserina, speak strongly in favour of the supposition that the child was alive when cast into the pond. It is self-evident that the cutis anserina cannot happen in a corpse, since it requires for its formation the existence of life in the skin; and, on the other hand, it is not easy to see how the child's skin could have been thrown into this state, except by the sudden impression of the water upon its naked and living skin." Accordingly we did not hesitate to conclude that the child had been drowned. In consequence, however, of defective subjective proof, the charge was found not proven, and the accused set free.

CASE [illegible].—DROWNING OF [illegible] [illegible] [illegible]—APOPLEXY.

The following case, as so many others of those here recorded, affords an example of the many extraordinary complications which occur in medico-legal practice, and it is all the more instructive from the facts having been distinctly ascertained before the dissection, which was only carried out because carelessness was suspected. A boy six months old fell out of bed, and was drowned in a pail in which his mother had steeped some [illegible], a few fragments of half-digested food, and some [illegible] [illegible] [illegible]. The body was found [illegible] [illegible], its head being in the fluid. The tongue protruded [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. The lungs were pale and anaemic, the [illegible] vessels of the heart were empty, both its sides almost empty of blood, the liver, spleen, and kidneys only contained the usual amount of blood; on the other hand the brain, and especially the sinuses, were very strongly congested. The blood was not particularly fluid. The trachea was perfectly normal and contained no fluid, but within the larynx there was a particle of half-digested food, which came undoubtedly from the matters vomited, as the liquid food in the child's stomach had a perfectly different appearance. There was no other fluid in the trachea or stomach. The case was so perfectly peculiar that we could not give any other decision respecting it than that the child had died from apoplexy, but that it could not be deduced from the results of the dissection that this had been caused by drowning, though these results were not opposed to this view.

CASE [illegible].—DROWNING.—DEATH FROM ASPHYXIA.

An unknown man was found in the water. Although putrefaction was already at the end of April so far advanced that the tracheal mucous membrane was as usual coloured of a dark brownish-red, yet death could still be distinctly referred to drowning. Death had been the result of pure asphyxia without any admixture of apoplexy. Blood-stained froth filled the trachea, much dark watery blood filled the lungs and, mixed with air-bubbles, the right side of the heart, whilst the left was empty. Moreover the kidneys were much congested, and in the stomach there was, besides a few fragments of potatoes, a [illegible] of bright clear water.

CASE CCCIII.—SUICIDAL DROWNING.—DEATH FROM ASPHYXIA.

A girl, twenty years old, had lain in the water from eight to ten days in January. The body had the usual corpse-colour, the face, neck, and upper part of the chest, however (as the commencement of the course of putrefaction in those drowned), were of a reddish colour. The tongue was incarcerated but not swollen. The hands and feet were of a greyish-blue and corrugated. On the inferior extremities there were traces of cutis anserina. The cerebral plexuses were pale, and there was only the usual amount of blood within the cranium. The lungs were hyper-voluminous, swollen, dark, rather hyperæmic, as were also the large vessels. In the left side of the heart there was a tablespoonful of dark and perfectly watery blood, in the right side about twice as much. In the trachea, which was visibly injected of a cherry-red, there was a quantity of fine-belled whitish froth, which could also be copiously expressed from the lungs. The stomach was quite filled with tolerably consistent food pulp. The urinary bladder was empty. The vena cava not immoderately filled.

CASE CCCIV.—SUICIDAL DROWNING.—DEATH FROM ASPHYXIA.

A man, aged fifty years, was dissected on the 15th of March, after he had lain in the water for six weeks. The colossal body was still only of the usual corpse-colour, and only the upper half of the face was of a brownish-red. There was no trace of cutis anserina. The hands and feet were much macerated. The tongue lay behind the teeth. The trachea was much putrefied, into it much bloody water ascended on pressure being made on the lungs. The blood still remaining in the body was tarry, and completely distended the right side of the heart, and the large blood-vessels. The lungs were of a dark slaty-blue, much distended, and contained a large amount of bloody water. The stomach contained nothing but from six to eight ounces (imp.) of water. The urinary bladder was empty, the brain brownish-red and pulpy from putrefaction.

CASE CCCV.—SUICIDAL DROWNING.—ASPHYXIA.

This dissection took place in May, three days after death. The man, aged forty years, had lain eighteen hours in the water. There was the usual corpse-colour, only the face and neck were coloured red. The tongue protruded between the teeth. Almost the whole skin was in the state termed cutis anserina. The penis was contracted. There was no cadaveric stiffening. The hands and feet were commencing to be grey and were moderately corrugated. The lungs were hyper-voluminous and covered with old adhesions. The trachea was injected of a rosy-red and empty, but pressure on the lungs readily filled it with rose-coloured large-bubbled froth. The left lung contained but little blood, the right was distended with black watery blood. The coronary vessels of the heart were strongly congested, its left side was much, and its right side immoderately distended with watery blood. The pulmonary artery was also turgid. The stomach was distended with a semi-opaque milky fluid. The intestines were of a rosy-red. The urinary bladder was half-full. The kidneys, the liver, and the spleen were not hyperæmic, but the vena cava was so. The cranial contents were normal.

CASE CCCVI.—DEATH FROM DROWNING.—ASPHYXIA.

A girl, aged twenty years, had lain seven days in the water, and then previous to dissection two days longer in our deadhouse, in January, at a temperature of from 0° to 8° R. = 32° to 50° F. The body was still quite fresh, but the head and neck were already very red. There was no cadaveric stiffening, but a strongly-developed cutis anserina. The lungs were much distended but not hyperæmic. The larynx and trachea were filled with a rosy-red froth, the quantity of which was considerably augmented by pressure on the lungs, the mucous membrane lining them was injected of a cinnabar-red; the right side of the heart was distended with watery blood, the left side was also full, but not immoderately so, and in both there were floating coagula. The stomach contained a great quantity of watery food remains. The kidneys were hyperæmic, the virgin uterus was filled with coagulated (menstrual) blood, the vena cava only moderately filled.

CASE CCCVII.—DEATH FROM DROWNING.—ASPHYXIA.

A perfect pattern as regards the diagnostic appearances. This man was thirty-four years old, strong and healthy, his lungs were so distended with water and air that, after the examination, much of both had to be let out by incisions before they could be replaced in the thorax. The whole of the trachea was injected of a cinnabar-red, and full of water and frothy mucus; the slightest pressure on the lungs forced out a great quantity of water and air-bubbles of various sizes up to that of a bean. The right side of the heart was distended with watery blood, while the left, the pulmonary artery and the vena cava ascendens were not overfilled. The stomach was empty of food and contained a cupful of clear water and some mud adhering to the mucous membrane. There was also so complete a cutis anserina of the inferior extremities as made the skin feel like a file, and a most remarkable contraction of the penis.

Case CCCVIII.—Accidental Drowning.—Cardiac Hyperæmia.

This case also deserves to be singled out of the mass and preserved, it is that of a boy, five years old, who, about the end of May, fell into a pit and was drowned. There was no cutis anserina. No cerebral congestion. The lungs were hyper-voluminous, and contained no water and but little blood. The trachea was pale, quite empty, and remained so even after pressure was made upon the lungs. The right side of the heart and the pulmonary artery contained a quantity of perfectly fluid blood, the left side of the heart was empty. The stomach contained some remains of food, and a teaspoonful of pure and not filthy water—the latter of which was rather to have been expected from the filthy and impure medium in which the child had notoriously been drowned. The urinary bladder was empty. The vena cava only moderately filled. All the other appearances were unimportant.

Case CCCIX.—Has this New-born Child been Drowned?

One October, the body of a new-born child was taken out of the Spree at Charlottenburg. It had every symptom of having been indubitably mature and viable. The head was already blackish-green, the body much less so, but the epidermis was all peeled off. The diaphragm stood between the seventh and eighth ribs. The stomach was empty, the colon contained meconium, the urinary bladder was empty, the spleen and liver were diffluent from putrefaction, the ascending vena cava was perfectly empty. The lungs by themselves weighed about one ounce and fourteen drachms (imp.); they were of a reddish colour, lightly marbled, crepitated upon pressure, but contained neither air nor bloody froth; both lungs had small gaseous bullæ from putrefaction upon their inferior surface, and both floated perfectly even when cut into pieces. The larynx and trachea were brown from putrefaction, and along with the gullet were quite empty, containing not even a trace of sand or the like. It could still be distinctly seen that the child at its birth had had a caput succedaneum. The brain, as usual in cases so far advanced in putrefaction, was changed into a reddish pulp, and could not be further examined. The sinuses were of course quite empty; the *basis cranii* was uninjured. Taking into consideration the facts, that the lungs were far too little putrefied to make their floating possible from that cause alone, the deep position of the diaphragm, and particularly also the colour of the lungs, we did not hesitate to say, that the child had lived after its birth; further, that the dissection revealed no appearances of death from violence, and that it was not probable that the child had been drowned, since not a single symptom favourable to this view was found, though no doubt the high degree of putrefaction prevented the giving of any more decided opinion.

CASE [illegible]X.—CASE OF CHILD-MURDER—INJURY TO THE HEAD AND DROWNING.

Death from violence was much more evident in the following case. The body of a new-born mature male child was taken out of the water in June. It was quite fresh, but the head was of a dirty copper-brown colour, and the hands were grey and corrugated like those of a corpse that had lain many hours in the water. The placenta, weighing ten ounces and a-half (imp.), was still attached to the child by means of the umbilical cord, which measured twenty-six inches in length. Upon the left side of the head there were seven, and on the right three sharp-edged wounds, on the left side of the face four, on the right side of the forehead three, and on the swollen upper lip one other wound, eighteen in all (punctures and incisions), from four to seven lines long, with effusion of coagulated blood in the subcutaneous cellular tissue. There were also two scratches on the neck; the eyelids and both cheeks were swollen and ecchymosed; there were blue ecchymosed patches on the shoulder-blades, the left arm, the right elbow-joint, and on all the toes of the right foot, proofs of the horrible ill-treatment the child had suffered. The diaphragm stood between the fifth and sixth ribs; the stomach contained a teaspoonful of yellowish water. The lungs completely filled the thorax, they were bright red with distinct bluish patches, and upon the upper lobe of the right lung there were three large subpleural ecchymoses visible. They floated perfectly, crepitated, and gave vent to bloody froth on being incised. The trachea was pale and contained a little faintly sanguineous froth. The heart was almost empty of blood. The whole of the dura mater was covered with a thick black coagulum one line thick, both parietal bones and the right side of the frontal bone were fractured in several places; the whole surface of the brain was covered with a layer of dark blood; there was great congestion of the vascular meninges and a deposit of half-coagulated blood on the *basis cranii* which, however, was uninjured. It was thus undeniable that the child had lived after birth, and had been alive when the various wounds and other ill-treatment had been inflicted on it. On the other hand, these injuries had not caused its death, for the unequivocal appearances in the lungs and stomach, proved that the child was still alive when it fell into the water, and death consequently had been the result of drowning. Since the child could not long have survived cranial injuries attended by such important consequences, it was, therefore, to be supposed that "the child had been flung into the water very soon after the infliction of the injuries upon its head, and in it its death had been finally completed." This was, therefore, a case in which an individual, fatally wounded and already dying, was drowned; and this often happens in cases of suicide and child-murder. The mother was never found out.

CASE CCCXI.—POSITIVE DIAGNOSIS OF DEATH FROM DROWNING IN SPITE OF COMPLETE PUTREFACTION.

The dissection took place in the end of March. This man, aged twenty-four years, must, from the advanced stage of putrefaction, have lain in the water from four to five months at least (in winter); and yet this was a case in which it could be determined with certainty that the individual must have been drowned (alive when he fell into the water). The head was of a brownish coppery-red, the chest and upper part of the body green, the epidermis peeled off, the penis retracted. The brain putrid and anæmic. The lungs were so far advanced in putrefaction as to be no longer distended, but collapsed and anæmic. The away, and was not found till the 5th of March, having thus been in the water exactly *three months and twenty-eight days,* and to this I must add, that the winter was one of the most severe and continuous cold that we have had for ten years. This explains the *comparatively* low degree of putrefaction attained, considering the long period elapsed, for the colour of the body was only of a greyish-green, though the epidermis was almost all peeled off, and those internal organs which putrefy early were already affected. The eyes, of course, could be no longer recognised; the brain was reduced to a greyish pulp; all the organs were anæmic, and the vessels empty of blood. The point of the tongue was prolapsed; the hands and feet were grey and corrugated. The lungs were pale, very anæmic, contained much watery froth, and *still* completely distended the thorax. The larynx and trachea were empty, and the mucous membrane covering them had the chocolate-brown colour of putrefaction. The heart was very flabby, and still contained in both its cavities, but chiefly in the right, some very dark greasy blood. The gullet was empty. The stomach, coloured of a reddish-brown by putrefaction, contained a large quantity of almost watery food-pulp. The liver, kidneys, spleen, and vena cava were anæmic. The intestines were coloured of a bright-red by putrefaction, and were empty. The urinary bladder was also quite empty.

CASE CCXCVII.—SUICIDAL DROWNING.—DEATH FROM NEURO-PARALYSIS.

The dissection of a girl, aged nineteen, took place in the end of April, and presented several points of interest. The body could only have lain a short time in the water, since, except a few livid stains on the face, it was not in the least discoloured, and the hands and feet were scarcely at all macerated. On the upper part of the body and the extremities there was cutis anserina. The tongue was incarcerated between the teeth. The hymen existed. The stomach was unusually large, contained some pulpy remains of food, and was quite distended with water, the quantity of which was so great, that a girl of her age could scarcely have drunk it at once. The kidneys were not congested. The vena cava ascendens, throughout its whole length, was filled with *many fibrous blood-coagula,* and contained not a drop of fluid blood. The lungs were not much distended, and were of a pale reddish-grey colour; little blood, but much water, escaped on incising them. Both sides of the heart contained much coagulated blood. The trachea was pale, contained a tolerable quantity of white froth, and pressure on the lungs forced into it much pure water and froth. Besides displaying many obvious unusual appearances, this case affords a further proof of the possibility of the coagulation of the blood after death, as we have already described. (*Vid.* Gen. Div., § 11, p. 23, Vol. I.)

CASE CCXCVIII.—SUICIDAL DROWNING.—DEATH FROM NEUROPARALYSIS.

A man, aged twenty years, was well known to have been drowned (in November), but the body had lain scarcely twenty-four hours in the water. It was certainly remarkable to find the cadaveric rigidity still persisting at the time of the dissection on the sixth day after death, and also to observe the complete absence of the cutis anserina, in spite of the low temperature of the water in November. The condition of the stomach was also very distinctly marked; it contained no remains of food, and was quite filled with pure clear water. As to the rest of the appearances on dissection, they were in this case once more purely negative: in particular, the brain and its sinuses contained only a moderate and normal amount of blood, the trachea was empty and not injected, and pressure on the lungs forced nothing into it, the lungs themselves were of a slate-blue colour, and seemed rather to contain a bright-red froth than to be hyperæmic. Neither the right side of the heart, the large venous trunks, nor the liver nor the kidneys, were hyperæmic. The bladder contained a teaspoonful of clear urine. However the balloon-like distention of the lungs, the cherry-red and very fluid blood, the complete filling of the stomach with clear water, as already related, and the distinct contraction of the penis, permitted us to conclude that death had occurred from drowning, which, as already said, had actually and indubitably been the case.

CASE CCXCIX.—ACCIDENTAL DROWNING.—NEUROPARALYSIS.

Passing over very many cases of drowning which display nothing unusual, I cannot omit to relate the following one, because it was distinctly ascertained that the child, a girl aged three years, had been drowned (in June) through carelessness, and the results of the skin assumes a blackish-blue colour, the scalp separates wholly or in part from the bones, and is blown up like a bladder, the eyelids form bluish-black hemispheres, the nose swells, becomes also blackish-blue, bloody ichor runs out of it and the mouth, the lips become swollen, and the blackish-blue neck is puffed up. In these cases we find larger or smaller patches of black blood effused, sometimes very copiously, beneath the scalp, the eyelids and their neighbourhood. This blood is generally fluid, but cases do also occur in which it is coagulated, grumous, and in these circumspection and experience are both required to prevent this alteration from being taken for the result of violence." No better description of this condition could be given, it is perfectly true to nature.

3. *Circumstances* outside of the mere results of the dissection may throw light upon this question. Thus a naked body in summer is favourable to the supposition of accidental drowning in bathing or swimming; the known occupation of the deceased as dyer, boatman, tanner, fisher, or the like, in the absence of any counterproof, is favourable to the supposition of accidental drowning in the course of exercising it. Stones attached to the body, writings in the pockets of the clothes speak for suicide, while bloody marks on the banks, rags of clothing, caps, sticks, &c., which are known not to belong to the deceased, many footmarks and the like give greater probability to the supposition of homicide.

4. The investigation of the *nature* and *depth* of the fluid must not be neglected by the medical jurist in investigating such cases. I mean that he must ascertain whether the body was taken out of running water, or from a swamp or dung-pit, &c., whether the water was deep, or so shallow as that a man *standing* in it could not have been drowned. But the value of these particulars must be estimated with the utmost caution, and with the most careful consideration of all the other circumstances attendant on the case, for experience teaches us that the most extraordinary complications sometimes occur. An epileptic may be seized with a fit at the edge of a trifling puddle and be drowned in it (Case LXXIX.); the deceased may have been drunk and drowned in a gutter; while, on the other hand, the whims of suicides are quite incalculable, since even when they have determined to drown themselves, they often reject a neighbouring deep and flowing water to go and throw themselves into some distant dung-pit.

5. Finally, the answer to the question of—How the deceased has come

by his death? is very often closely dependent upon that to the query, *How long* has this man probably been in the water? For instance, when it is known that the deceased might have been murdered upon a certain day, and his body has been sometime thereafter taken out of the water. We have also had to answer this query in innumerable instances where the bodies of new-born children have been found in the water, whose mothers have either not been known, or if any one has been suspected, it has been of importance to the Judge to compare the time of the death, as determined by the period which the body has passed in the water, with the time of the suspected birth. This question is extremely difficult to answer with actual certainty. Large experience and great practice, however, enable an approximative period to be fixed upon. The basis for an opinion is to be taken solely from the alterations which the body gradually undergoes in the water.

§ 58. CONTINUATION.—HOW LONG HAS THIS BODY LAIN IN THE WATER?—THE PROGRESS OF PUTREFACTION IN WATER.

I have already (§§ 19 to 22, p. 38, &c., Vol. I.) detailed at large the alterations which the human body undergoes in the course of advancing putrefaction. Now, though as a whole, these alterations occur in much the same manner as in other cases in bodies floating in the water, with this single exception that, though saponification may occur, there is never the slightest trace of mummification, yet bodies in the water present many peculiarities which must be now described. In order to determine from these changes how long time has probably elapsed since death occurred, it is of first and special importance to ascertain the atmospheric temperature, and this is always the case when we desire to draw any conclusions from the state of putrefaction of the body. A condition not found to be produced in winter at a temperature of — 10° to 15° R. = 9°.5 to — 1°.75 F., in less than one month, or indeed in water and under the ice in less than two or three months, is found to be produced in eight days in summer at a temperature of from + 16° to 20° R. = 68° to 77° F. The condition of the water also exerts some influence. Bodies continually floating in running water putrefy *cæt. par.* much more slowly than those macerated in a marsh or puddle. Much also depends upon the medical jurist ascertaining how long it is since the body which is to be dissected has been removed from the water. Every practitioner very well knows, that many days are often spent in writing backwards and forwards, reporting, arranging matters, &c., before it comes to the actual dissection of the body, which has all that time been lying waiting. An inexperienced practitioner is apt to confine his attention to the state of the body as he finds it, and important error may thus arise in regard to the question now before us. For bodies which have been removed from the water, putrefy with extreme rapidity, particularly when they lie in the sun or in some warm place. I have seen very many instances of bodies taken quite fresh out of the water and exposed in our deadhouse (morgue) to the sun's rays, particularly in summer, till they were claimed for burial by their relatives, or buried at the public expense, which in three or four days have attained a degree of putrefaction that would not have been possible in the water, even after the lapse of twice or three times as long a period. I cannot too strongly impress upon medical jurists the importance, deduced from this experience, which is one that everyone who has the opportunity can make for himself, of urging upon the public prosecutor or presiding Judge, the necessity of making a speedy dissection in such cases, particularly in important criminal cases, since the delay of even twenty-four hours often results in making this wholly useless.

Though the conditions mentioned exercise a modifying influence upon the progress of putrefaction in bodies found in the water, there is yet one circumstance peculiar to these bodies which *never* fails, and when it has once been learned it enables us almost infallibly to recognise a body on approaching it as one that has been taken out of the water, giving as it were a provisonal indication of death from drowning. Only a provisional! for I have convinced myself, that this peculiar march of putrefaction depends not upon the *kind of death*, but upon the position of the body in the water, so that it is also found in bodies which have fallen or been thrown into the water after death. Orfila, Lesueur, and Devergie first directed attention to this symptom, but it has not met with that attention in Germany which it really deserves. I refer to the circumstance that in bodies found in the water *putrefaction begins from above downwards*, whilst, as is well known, after every other kind of death, and by the continuance of the body in any other medium, as in air or earth, this first appears on the abdominal coverings, and extends upwards and downwards. My observations are in perfect unison with those of the French authors mentioned, and with those of Simeon,* and are as follow :—

A body that has lain in the water about eighteen hours in summer, or from twenty-four to forty-eight hours in winter, and has then been exposed to the air for about the same length of time, besides the condition of the hands and feet already described (p. 235, Vol. II.), and while the whole body is still only of the usual corpse-colour, and the abdominal coverings have not the slightest tinge of green, already displays the commencement of a faint livid bluish tinge of the face, head as far as the ears, and the upper part of the neck, and this rapidly becomes of a brick-red. Incisions into such parts reveal no ecchymoses. Fine or large-belled froth is also found lying over the mouth and nose, when the deceased has actually been drowned, but not otherwise. Bluish-green patches soon appear amid this redness, first upon the ears, temples, and neck, and afterwards upon the throat and chest. The longer the body remains in the water, the more these patches run together, and we may conclude, that the body has been in the water from three to five weeks in summer, or from two to three months in winter, when we find the head and throat, and lastly, the chest, of a dirty-green with intervening patches of dark-red, which Devergie has called "brownish" (brunâtre),† a very unfitting term in my opinion. It is by no means rare to see bodies taken out of the water, whose head, throat, and chest already display this degree of putrefactive coloration, while the rest of the body is scarcely at all discoloured. Whence this inversion of the putrefactive process, and whether it depends upon the fact, that so long as the body floats in the water its head always remains *below* the water, or upon the direct opposite, as has also been supposed, because the light and sun's rays strike directly upon the head floating *above* the water, may be left to each one to explain as he will. The putrefactive discoloration of the skin with all the other concomitant phenomena of putrescence which belong to it, the puffy swelling, the vesicular elevation and peeling of the cuticle, the separation of the nails, &c., proceed now, in the case of longer continuance in the water, from above downwards in the same relative manner, and with precisely similar appearances as we have already accurately described (*loc. cit.*).

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* *Vid.* Casper's Vierteljschft., III., s. 305.

† *Vid.* the representation, Plate III., Fig. 7.

With due consideration of the temperature and peculiarities belonging to the water, as well as of the time during which the body has lain exposed to atmospheric influences after being taken out of the water, we may conclude approximatively that a corpse has lain in the water five or six weeks in summer, and twelve weeks or longer in harvest and winter, when the whole body is greatly swollen, the epidermis almost all peeled off, the colour entirely of a greyish or blackish-green, with large dirty-red venous cords coursing through it in various parts, the features perfectly unrecognisable, the ears, eyelids, and lips quite shapeless from swelling, the nails detached from many of the fingers and toes, and hanging by shreds of skin, and in the case of a man, the scrotum and penis swollen out of all shape. If the corpse have lain in the water seven, eight or ten weeks in summer, and in winter from four to six months, it will then be still more advanced in putrefaction. The longer, however, a body remains in the water, so much the more uncertain becomes any estimation of the time it has continued in it, because the advanced stages of putrescence are *uniformly protracted over an unusual period of time.* The following is the appearance of a body thus metamorphosed; the scalp is separated from the bones, on which hangs only a few shreds with hair attached, which drop at the slightest touch; the eyes are run out: the corpse is rarely uninjured, usually it is much torn by water animals, and fingers, hands, and the long bones of the upper extremities, ribs, &c., are specially apt to be gnawed by water-rats. Thousands of maggots cover the face and the natural outlets of the body. Single joints are separated from their connections. The body is blown up to a colossal size, its colour is entirely black, or at least of a deep dark-green, almost black, and its smell is insupportable. The nails are all detached, and are often no longer to be found on the body. Some patches of the muscles are already saponified. It is also by no means rare to find the cavities, even the cranial one, already opened, because the gases produced by decomposition have already burst the general coverings, and even separated the bones of the skull, which they generally always do at last. It is usually quite impossible any longer to recognise the body, unless some peculiar circumstance should render this possible, and even its sex is no longer apparent.

Case CCCXX. gives an example of the changes undergone by bodies which have lain several years in the water.

In regard to the chronological succession of the putrefactive changes which the internal organs of the body undergo, I beg to refer to the detailed account already given in the Gen. Div., § 22, p. 44, Vol. I., since bodies found in the water present no variations in respect of them.

§ 59. Illustrative Cases.

Case CCCXII.—Doubtful Suicide by Drowning.

A robust man, aged 42, had left his home on the 2nd of January, to pay a rent then due, and to discharge a matter of trusteeship, and for this purpose he had put a document into his pocket, which must have fallen into the hands of a third party. Ten weeks afterwards his body was found in the water, with the receipt for the rent in his pocket, but not the document. He had formerly been a Roman Catholic, but had now become a Christ-Catholic, and for this tergiversation it was stated that he had a punishment to expect in his fatherland; now though this seemed to hint at the possible existence of a religious frenzy, still the disappearance of the document in question was sufficient to raise the suspicion of murder, and to occasion a medico-legal examination. The body was of course, after so prolonged a maceration in the water, extremely putrefied, perfectly green, the head almost black, the cuticle everywhere peeled off. The eyes were staringly protruded, the tongue firmly wedged between the teeth, its point, which for two lines protruded beyond them, was swollen. There were no traces of injury visible externally. In the thorax we found the lungs much distended, containing rather little than much blood; the left side of the heart was empty of blood, the right filled with blood rather dark and treacly. The trachea still contained a small quantity of bloody froth, its mucous membrane displayed the usual brownish cherry-red colour of putrefaction. No water was found either in it or in the lungs. The brain was already changed into a bloody pap, and could not of course be more narrowly investigated. The *basis cranii,* however, and all the other skull-bones were quite uninjured. The stomach contained a small quantity of reddish food-pap, but no water. The stomach with its contents, and also the duodenum and œsophagus were chemically examined, but revealed no trace of any poison. The omental and mesenteric veins, the large venous trunks of the abdomen and the right kidney, in spite of the advanced state of putrescence, still contained much

blood. The other abdominal organs were normal. On the left sid
of the throat, stretching to the neck, there was a whitish, scarcel
depressed, mark two lines broad, which was soft (not leathery) to cu
We gave it as our opinion: (1.) That the deceased had died fro
asphyxia. (2.) That it was possible and indeed probable that this ha
been occasioned by drowning. (3.) That the high degree of putr
faction in which the body was, prevented any certain conclusions bein
drawn from the mark found upon the neck. (4.) That supposin
death to have been caused by drowning, it cannot be determine
with any degree of probability, whether it has been a case of acc
dent, suicide, or homicide.

After several months the missing document was found, an
further judicial investigations placed it beyond doubt that in th
case the death from drowning had been suicidal.

CASE CCCXIII.—DOUBTFUL SUICIDE.—DROWNING.—CRANIAL INJURIES.

On the 8th of December, we had to make a medico-legal disse
tion of a very crooked man, aged forty years, whose body had lain f
eight days in our institution after its removal from the water.
the head there were three wounds, each one inch long, partly obtus
angled, and partly slightly crescentic in shape; they did not pen
trate to the bone, but only divided the scalp quite superficially, a
had tolerably sharp, dry, and ecchymosed edges. There was
cutis anserina on the body, but the hands and feet displayed th
characteristic condition. The whole of the body was of the usu
corpse-colour, but the head had brick-red stains on it. Within t
cranium there was only a moderate vascular congestion. The lun
were remarkably hyper-voluminous, completely distending th
cavities, they contained but little blood, but the left contained mu
water, and the right somewhat less. The coronary vessels of t
heart were moderately congested, the left side of the heart w
almost empty, the right contained only half-an-ounce of blood, b
the large vessels were turgid with blood fluid and almost black. T
larynx and trachea were quite empty and normal. The liver w
tolerably full of blood. The stomach was three-fourths filled wi
pure water, in which floated a few particles of potatoes. The mes
teric veins were much injected. The kidneys and vena cava w
hyperæmic, the urinary bladder was empty. We gave it as

opinion :—1. That the deceased had been drowned. 2. That the cranial injuries could not be regarded as co-operating in producing the fatal issue, but must have been inflicted during the act of dying, or soon after death. No reasoned report was required from us. (As a psychological curiosity I may add, that on unclothing the body, it was found that to equalise his shape, this man had worn next his skin an actual shirt of leather, with a thick broad pad on the opposite side of his hump!).

Case CCCXIV.—Drowned or Murdered?

This case is that formerly mentioned as a fitting side-piece to that of Könen in the Fonk trial, only it was, from a very remarkable circumstance, more easy to decide than that was. In April, 1848, an unknown body was taken out of the Spree, which was, however, soon recognised as the body of a shipmaster, who disappeared from his vessel on the evening of—say the 18th of March, 1848, and had not since been seen. A well-grounded suspicion of robbery and murder was directed against the servant of the deceased, who, on the morning of the 18th of March, when no man in Berlin could foresee the dreadful termination of the day, had locked up a considerable sum of money for his master, which was missing from the broken chest on board the ship, and part of which, along with articles of clothing belonging to the deceased, was found with the servant, who, however, obstinately denied his guilt. For the accusation, it was a most probable supposition, that the servant, on the evening of the 18th of March, when the fires of riot raged in Berlin, had taken advantage of the general anarchy and confusion to perpetrate a robbery and murder, which he might hope would remain undiscovered at such a time. But to return to the dissection, at which of course we had not the slightest suspicion of these discoveries. The body when taken out of the water had on a thick brown cloth overcoat, a handkerchief and several rags were *wound round the head*, and *tied* with a cord round the neck, the legs were also tied together with a string. The body was already greyish-green, consequently far advanced in putrefaction. (The temperature of this spring had been with us continuously high.) The bluish-green and swollen tongue protruded from between the toothless jaws. No mark of strangulation could be seen upon the neck. But there were important *cranial injuries*, one three-cornered one with blunt ragged edges over each eyebrow, and one an inch long on the right parietal bone; in at least two of these wounds ecchymoses were brought to light by incisions. When the epicranial aponeurosis, covered with half-coagulated blood, was torn off, we found a complete smashing of the whole skull, including even the *basis cranii!* The brain, a (bloody) pap, as is always the case in bodies so far advanced in putrefaction, could no longer be investigated. The lungs, especially the right one, were distended with black and not very fluid blood; the trachea and larynx were blackish-blue from putrescence and empty; the heart was perfectly empty, as were also the large thoracic vessels; the stomach empty, as was also the urinary bladder; of course in such a degree of putridity the vena cava was likewise empty, and except the advanced degree of putrescence of all its organs there was nothing else remarkable in the abdomen. It was, as is evident, a very plain case. It was just as difficult to understand why a suicide should have so bound and tied his head and legs, even if he could have done so, before throwing himself into the water, as to conceive what could have induced a third party to do so, when his intention was simply to throw the man into the water and drown him. There were certainly no proofs found in the body of death from drowning, and the advanced stage of putrescence would have rendered these very uncertain, even had the man been actually drowned—but it was easy to prove that this shipmaster had not been drowned, but had been killed by the fearful cranial injuries inflicted on him, and afterwards bound up and thrown into the water, since the ecchymoses found proved that these injuries must have been inflicted during life, and thus rendered untenable the assumption that they might possibly have been accidentally inflicted on the corpse while floating in the water. Moreover, the nature of these important cranial injuries, particularly the fracture of the *basis cranii,* always necessarily presupposes the employment of the utmost violence by means of blunt weapons—we adduced as examples of such an axe, hammer, club, &c.—such as could not possibly happen by simply floating against piles, or by being struck by stones or rudders. Accordingly—apart from the then statutory lethality questions—we assumed that the deceased had not been drowned, but had been killed by (absolutely fatal) cranial injuries, and only thrown into the water after death, and that these cranial injuries had been inflicted with very considerable violence, and with a blunt weapon.

So much for our task, the reader will perhaps be interested in the following appendix. Everybody was fully convinced of the guilt of the accused, and yet the verdict was, as it ought—"Not guilty!" For the identity of the body was doubtful, as first appeared at the time of the public oral trial. The widow of the murdered man, living in a small provincial town, was summoned to the trial in order to confirm supplementarily the identity of the body from the articles of clothing, and the external description of the body contained in our protocol of the inspection—she had not been summoned for this purpose at the discovery of the body, because it was at that time wholly unknown. She recognised the articles of clothing, but when questioned about the colour and condition of the hair, eyes and teeth, &c., of her husband, this very feeble-minded woman gave indistinct and wavering answers. Thus, as we have said, it remained doubtful whether the body of the murdered man was that of the shipmaster K., and therewith fell the proof that the accused, his servant, had murdered his master.

CASE CCCXV.—ACCIDENTAL OR INTENTIONAL DROWNING?

This case, that of a young physician, excited at the time the most general interest. This young man, aged twenty-six years, was, many years ago, seen one evening in a wine-shop very tipsy, and then he vanished leaving no trace behind. Rumour took possession of the case, which grew ever more and more wonderful, till at last it was said that the body had been found cut in pieces in the cellar of a brothel! This report, however, had no foundation, but three months afterwards, on the 3rd of February, after the breaking up of the frost, which had lasted for two months continuously, the body was found in the water, where, according to the police report, it had constantly lain under the ice. The relatively insignificant state of putrescence of the body was thus easily explicable; it had just become uniformly green, the epidermis was everywhere peeled off, the nails, all but a few, firm, of course the skin of the hands and feet was corrugated. As was to be expected, we found a state of genêral anæmia, only in the vena cava there was still a moderate quantity of thin syrupy half-coagulated blood, and in the right side of the heart there were a few coagula. The larynx and trachea were quite empty and brown from putrefaction. The lungs, the fluid being all evaporated, were not balloon-like distended, the large vessels were empty. In the putrefied stomach there was still a little solid remains of food, no trace of any fluid; the urinary bladder empty, all the other organs already much putrefied. Of course no certainty as to the cause of death could be attained in this case. Nevertheless, the negative evidence was confirmatory of what little positive proof there was, and permitted the assumption of death from drowning with "great probability." To this we added, that the dissection had revealed nothing that could justify any suspicions as to the guilt of a third party.

Case CCCXVI.—Accidental or Intentional Drowning?

In the following case the question sought to be decided was precisely the same as that in the previous case, viz., whether a crime had been committed, or whether the man had been accidently drowned; and the body was also much putrefied. A journeyman mason, aged forty-eight years, who, six weeks previously had got into a quarrel when very drunk, was said to have been very ill-treated in the course of it, and disappeared on his way home, was taken out of the New Canal on the 3rd of April, 18—. According to the police report, the body displayed a broken nose, swollen and protruding eyes, and cranial injuries. In the room of all these we only found the eyelids swollen from putrescence. The nose was squeezed flat, as it often is in a corpse, and there was no trace of any injury upon the head. The body was green from putrescence, the cuticle peeled off. Of course, in such a state of matters, no certain result could be expected, especially as regarded death from drowning. There was anaemia within the cranium: the brain was pultaceous and green. Both the lungs were still much distended, and contained much dark blood; the large vessels contained a moderate amount of blood; there was about two ounces (imp.) of dark coagulated blood in the right side of the heart, and about one ounce (imp.) in the left one. The trachea and larynx, as in all such cases, were empty and of a brown cherry-red from putridity; the vena cava still contained a moderate amount of blood; the liver was much congested, the urinary bladder was half-full, the kidneys still visibly congested. Our opinion was given, that the deceased had not been killed by the infliction of any injuries, that the advanced state of putrefaction of the body did not permit any positive decision as to any other kind of death, but that it was, nevertheless, highly probable that the deceased had been drowned.

CASE CCCXVII.—DROWNING.—SUICIDE OR HOMICIDE?—THE LEGS OF THE BODY TIED TOGETHER.

The body of a man, aged twenty-six years, was taken out of the water with his legs fast bound together with a leather thong, and this, as well as the discovery of three reddish-brown crusts the size of a fourpenny-piece upon the angle of the lower jaw, which seemed quite trifling, occasioned the medico-legal dissection. The results of this in this perfectly fresh body were extremely well marked. There was a cutis anserina over the whole body. Hands and feet grey and corrugated. The tongue protruding for two lines. Nothing anormal within the cranium. The lungs were hyper-voluminous, marbled with blue, both distended with dark, fluid, and frothy blood. The mucous membrane of the larynx and trachea strongly injected, and their cavities stuffed full of a fine-belled rosy-red froth. The right side of the heart was distended with dark watery blood, the left was empty. The large blood-vessels and the vena cava ascendens were also turgid with blood. The stomach contained no remains of food, but about three to four ounces of bright clear water, the urinary bladder contained a tablespoonful of urine. The other appearances found in this remarkably healthy body presented nothing remarkable. With these results we did not hesitate to assume the certainty of death from drowning, and, in spite of, or rather because of the legs being tied together, that it was suicidal, since a similar procedure is very commonly put in practice by suicides in order more certainly to attain their end, while many peculiar circumstances must coexist, no traces of which were found upon this body, in order to render probable the exercise of such violence by a third party.

CASE CCCXVIII.—DROWNED, STRANGLED, OR KILLED BY BLOWS?—RUPTURE OF THE BRAIN.

A case of rare interest! Only two days after the case just related, a watchman, aged sixty, was found dead *standing* in the basin of the New Canal. He was clothed and had on a neckcloth, and over it there was a cotton cloth *firmly bound round the neck.* The tongue lay behind the teeth. The body was of the usual corpse-colour, but the whole of the left side of the face, inclusive of both eyelids, had a livid appearance, and incisions revealed actual ecchymosis. The left eye was bloodshot. On the top of the bald head there was a brownish-red, hard, unecchymosed patch two inches long and three-quarters of an inch broad, and a similar one three-quarters of an inch long and half-an-inch broad upon the forehead, above the left eye. Beneath both knee-pans there were also several small ecchymosed patches. On the posterior half of the left cerebral hemisphere, there was a blood coagulum one line thick, and one line and a-half in diameter; in the right lateral ventricle there was an effusion of about half-an-ounce (imp.) of dark coagulated blood. This extravasation was connected with a rupture of the brain one-quarter of an inch in diameter, which passed from the lateral ventricle right through its whole thickness. The base of the left hemisphere displayed numerous small isolated patches of extravasation, and in their midst the rupture ended as a small round hole with ecchymosed edges. Also on the right side of the cerebellum there were numerous small isolated extravasations. The sinuses were only moderately filled, the *basis cranii* uninjured. Both lungs were perfectly normal and contained but little blood; on the other hand, the pulmonary artery was much congested with dark fluid blood. The larynx and trachea were empty and perfectly normal, as was also the œsophagus. In the right side of the heart there was about an ounce (imp.) of dark fluid blood, and in the left a trifling quantity of the same. The liver contained a moderate amount of blood. The vena cava was strongly congested, the stomach contained about three or four ounces (imp.) of pure water, containing a little flocculent matter, the other abdominal organs were perfectly normal. The urinary bladder was not quite empty. In the first place it was indubitable that here the cranial injuries, the external traces and the internal effects of which were so obvious, must be recognised as the cause of death, and indeed, as at that time the doctrine of lethality still reigned, they had to be described as "absolutely fatal." This of course in a case of rupture of the brain was indisputable. These cranial injuries could not, however, be regarded either as the consequence of a strangulation, which had, moreover, left no trace on the naked throat of the body, or of the act of drowning, for to say nothing of the facts that the body was found standing with its head above water, and that neither strangling nor drowning ever can produce such injuries, every one of those appearances were wanting which could in their totality justify the assumption of either one or other of these kinds of death. Finally, it must be concluded, as we have already often detailed, from the rupture of the brain, and the numerous extravasations, that very considerable violence had been applied externally, and in accordance with all experience relating to contused wounds, it was not to be supposed that the deceased had inflicted this violence upon himself. The noose round the neck was also employed as a farther reason to justify the conclusion, that the deceased had been killed by cranial injuries inflicted by a third party, and that he had been placed, either after death or while dying, in the position in which his body was found. No reasoned report was required, and I have heard nothing farther regarding this extremely remarkable case, and from this I suppose, that the inquiries after the perpetrator or perpetrators of the deed were fruitless, and that the documents connected with it were laid aside.

CASE CCCXIX.—DROWNING, STRANGLING, OR NATURAL DEATH?

The following case regarding a mature, new-born, female child, was somewhat like the one just related. The body was found on the 28th of July, 18—, in a water-cask in a court-yard, clad in a piece of cotton cloth, and tightly bound round the neck with a common venesection bandage two inches broad. The girl who was ascertained to be the mother of the child, confessed that she had given birth to it alone on the night between the 26th and 27th of July. According to her statement, she had heard the child crying, but swooning away, only awoke to find it dead in bed beside her. In spite of the summer weather, the apartment was said to be cold and damp. She said that she had concealed the body in her bed till the evening, and then flung it, clad as we have described, into the water-cask. She constantly asserted that the child had been dead. The child had no cutis anserina. On the left side of its neck there was a trifling bright-yellow stripe three-quarters of an inch long and one line broad, without any trace of ecchymosis. The bones of the cranium were much injected, the cerebral veins hyperæmic, and there were two extravasations, each the size of a fourpenny-piece, at the base of the brain. These were the only remarkable appearances; and in particular there was not a single symptom that could justify the assumption of death from drowning. The child, therefore, had died from apoplexy; and we went on to say in our report, that, considering all the other circumstances of the case, such an apoplexy as in this instance lay before us, excluded the supposition that the child had been alive when put into the water and had been drowned in it. We supposed, indeed, that this apoplexy might possibly have arisen from strangulation, but that it was not probable that it had done so, since there was so little evidence in favour of the child having been actually strangled, and considering that all that the accused had stated in regard to the circumstances attendant on the birth contained at least a certain amount of truth, and that apoplexy is one of the most frequently fatal diseases of new-born children, we concluded that it must be assumed, that this child, lying helpless in the cold and damp apartment, most probably had died from apoplexy from internal causes.*

CASE CCCXX.—SKELETON OF A PERSON DROWNED RECOVERED AFTER TWO YEARS' IMMERSION.

The disappearance of one of our well-known university professors on the 1st of March, 1854, excited universal interest; in spite of the most carefully instituted inquiries, every trace of him was lost. Finally, in clearing out the canal at Charlottenburg, on the 5th of July, 1856, after the lapse of two years and a-quarter, a skeleton was found, and sent to us for examination; it was a naked skeleton, the only part of which that yet retained its shape was the left foot, the soft parts of which were changed into adipocire. Muscular remnants in the shape of adipocire were also found upon the inferior extremities and upon the nates. Balls of adipocire also lay under each zygoma, and the saponified eyeballs lay within their cavities. The whole of the right and the half of the left upper extremities were wanting, as was also the whole of the right foot. Only the manubrium of the sternum still remained. The perfectly uninjured skull with its lower jaw, and the three first cervical vertebræ united to it by adipocire, had lain in the water near the skeleton. The remains could, however, be still unquestionably identified. For the skeleton had on a waistcoat with a purse in its pocket, and on the left foot there was a boot and a stocking marked with the initial letters of the vanished man; these effects, as also a watch and neckcloth, which were likewise taken out of the water, were all recognised by the brother of the missing professor. It was more instructive for us, however, to learn from his brother, that the deceased had an osseous tumour on the left side of the head, and we actually found this swelling on the left parietal bone, of the form and size of half a small nut.

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* *Vide* Case LXXIX.,—that of an epileptic drowned in a turf-puddle, as already related.

CHAPTER VII.

DEATH FROM COLD.

§ 60. General.

Death from cold is next to death from starvation, the rarest of all the kinds of violent death which come before the medical jurist. Such cases occur more rarely in towns than in the open country, where men in travelling on lonely roads fall asleep at night by the way, or during the day are overwhelmed in violent snow-storms, or wandering from the road fall into deep snow, &c., and succumb to the deadly influence. It is usually supposed, that the physiological cause of death from cold is, that it repels the blood from the peripheral vessels into the centres of vitality, and thus produces fatal hyperæmia of the brain and thoracic organs. Physiology has not yet determined, and probably never will determine, how it happens that, with the well known power possessed by man of living healthily in all climates, and with the equally well known experience of fortunate individuals in withstanding the most extraordinary degree of cold,* this ability to withstand cold should yet be in some cases insufficient to avert death. All that we certainly know in this respect is, that individuals who possess but little power of reaction, such as new-born or young children, very old, sick, starved, or mentally-depressed men (as the French army in Russia in the winter of 1812!) more easily succumb to the fatal influence of cold than others, and experience has also taught us that conditions such as sleep and drunkenness, which favour congestions within the cranium and thorax, promote the tendency to death from this cause under certain conditions. But nothing can be determined, even approximatively, regarding the thermometrical degrees which come here in question; there is no "absolutely lethal" degree of cold. Of the numerous men employed in the recent British expeditions to the North Pole under Parry, Ross, and Franklin, as well as in the Siberian expedition under Wrangel, not one died from cold, although they had to withstand an unmeasurable degree of cold (the thermometer having been long frozen), whilst drunkards and new-born children die of cold at a temperature of — 15° to 20° R. = 30°.25 to 19° F., a temperature at which the fashionable world in northern cities frolic about on sledges and snow-shoes. In this respect, therefore, no point can be obtained of the slightest diagnostic value in determining cases of doubtful death from cold, except this—that this death generally can only occur in a very few months of the year!

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* Wrangel's Reise nach Sibirien. A. d. Russ. Berlin, 1840.

§ 61. Diagnosis of Death from Cold.

Even in regard to the appearances found on dissection, there is not one which can with any certainty justify the assumption of death from cold. It has been stated, that the ears, point of the nose, fingers, &c., can be easily broken off the bodies of those frozen to death, but not one single example of this has occurred to me, though, in truth, my experience of these cases has been but scanty. It is evident, however, that such a circumstance could only prove that the limbs of the deceased had been killed by cold before his death, but not that he himself had died from cold. The bodies of those who die from cold are certainly when discovered frozen stiff, and even individual organs, particularly the brain, lungs, and distended bladder, are frozen, and the blood and other fluids, as well as the contents of the stomach, if any, turned to ice. But we need scarcely remark, that this is a post-mortem phenomenon, and may happen to the body of any man whatever kind of death he may have died, particularly if it has been exposed naked to considerable cold for any length of time. Of this the bodies which come before us in our judicial capacity afford us numerous examples every winter. In severe winters we have, after every possible kind of death, often found brains so hard frozen, that they had to be chiselled out in order that the *basis cranii* might be examined, and had often to remove blood from the heart enclosed in a crust of ice, and to take food frozen hard out of the stomach. On the other hand, the freezing of the body, even when it has existed in those actually dead of cold, is of no probative value, since it may disappear, and will do so when the body by being placed in a warm apartment is permitted to thaw till the time of the dissection. The hyperæmia in the skull, in the lungs, in the heart, or in the abdominal vessels and large venous trunks, or in all of them together, are also of no probative value, since these appearances are all found quite as well marked after many other kinds of death. It is therefore only possible for the medical jurist to give his opinion as to the greater or less probability of the death having taken place from cold by considering the whole of the appearances found on dissection, in combination with the concomitant circumstances attendant on the death, and the negative evidence afforded by the absence of any evidence at least of any other kind of violent death. In respect of the negative evidence I may direct attention to a circumstance which has been hitherto quite overlooked. It is this, that when *a body already commencing to putrefy* is found in snow or ice, it may be concluded with certainty, let the appearances on dissection be as they may, that the deceased has not *perished from cold,* that is to say in other words, that he has not been alive when he got entangled in this snow or ice, and thus perished, but must have been already a putrefying corpse before this occurred. For bodies lying in snow or ice do not putrefy (*Vid.* Gen. Div., § 17, p. 36, Vol. I.). Case CCCXXII. about to be related, gives an example of the practical value of this dogma.

§ 62. Homicide or Suicide?

Since the nature of this form of death is such as to require that the fact of its occurrence should be determined by the attendant extraneous circumstances, and not from the appearances on dissection, so it is easily comprehensible that the question whether death has been caused by accident, suicide, or the carelessness or criminality of a third party, must be decided from other still more extraneous data. The idea of intentional suicide must be in general excluded, for experience teaches us, that suicides do not choose this uncertain kind of death, since in hundreds of cases they would fail thus to attain their end, which they can more certainly and easily arrive at in many other ways. In the case of new-born or young children, who must be regarded as having actually died from cold, the circumstances in which the body has been found may be able to throw light upon the question, whether death has been caused intentionally or accidentally. The latter will be found to have been frequently the case in regard to instances of secret childbirth in very cold apartments, when the mother has fainted or otherwise lost her senses immediately after delivery, and the naked child, that has just left the warm uterus, has been left lying upon a cold stone floor or the like. On the other, the idea of intention will be at once suggested when the body of a child, naked or rolled i rags, &c., has been found in snow, upon ice, in a wood, or in any othe lonely or remote spot. In the case of adults, accident is generall the cause of this form of death, and the circumstance that it has occurred on the return from a 'jollification' will strengthen the supposition. In such cases cranial or other corporal injuries, which th deceased may very possibly have received before his departure from the wineshop, may excite suspicions, and they are all the more likel to do so when the apoplectic condition of the brain, which was to b expected, has actually been found on dissection, and a causal connection between it and the cranial injuries may seem doubtful. Th totality of the circumstances attendant on each individual case mus guide the prudent medical jurist in the formation of his opinion. I does not seem that important and very doubtful cases of this character are of frequent occurrence, at least not one single case, simila to what we have here supposed, has occurred throughout the whol Prussian monarchy, or given rise to a reference to the Royal Scientifi Commission for Medical Affairs for its *superarbitrium* during th twenty-eight years in which I have been a member of it.

§ 63. Illustrative Cases.

Case CCCXXI.—Death from Cold of a New-born Child.

In the end of January, 18—, during very severe cold, the unmarried woman N. gave birth to a boy during the night, after she had left her bed on account of the pains, and had sunk down upon a stool, under the following circumstances according to her statement:— "My washing-basin," said she, "stood on the floor quite near me, I drew it towards me to catch the blood, when suddenly, as I sat upon the edge of the stool, a part of the child was forced out of my sexua parts. I did not examine it, but probably it was the head. I continued sitting with my legs stretched asunder, and almost senseles from the continuance of severe pains. Probably in about a quarter of-an-hour the rest of the child escaped from my sexual parts. It slid down upon the floor. In a short time I recovered my senses, and then I saw the child lying on its back in the washing-basin. It head was downwards, and its legs lay towards me resting upon the edge of the basin. It was quite cold, and I thought it dead. I took an old shift, spread it out upon the top of the dirty clothes in the clothes-basket, and laid the child upon it, without covering it in any other manner." And the perfectly fresh body was found as described, exhibiting as we now remark all the signs of maturity. The diaphragm stood only between the fourth and fifth ribs. The lungs filled about three-fourths of the thorax, and had at least a partially bright-red marbled appearance, they floated perfectly, and incisions into them gave vent to bloody froth, and were accompanied by a sound of crepitation. It was ascertained that the child had died of apoplexy, and this was proved by the livid colour of the face and lips, the great congestion of the skull-bones, of the vascular meninges, and of all the sinuses, which were quite distended, and finally, by the absence of the signs of any other kind of death. "In the absence of every trace of external violence," we went on to say in our report, "the question now arises—what has been the the cause of this apoplexy? and this seems to us not at all difficult to answer, when we consider the manner in which the birth took place, as it has been described, and the very severe cold which prevailed on the night in which the child was born. There is nothing contrary to experience in the statement of N. that she had lain for some time senseless. During this period the birth was completed, and the child fell into the cold basin in the cold room where it remained lying. Seeing that it is more than probable that the child died from cold very shortly after its escape from the maternal womb into the frosty atmosphere, inasmuch as the post-mortem appearances usually found in such a case are precisely those found in this child; and to this we must add, as supplementary evidence, the frozen condition in which its brain and lungs were found; so this probability is greatly increased when we consider that there is much less reason for supposing that there was any other cause for the apoplexy. Accordingly we gave it as our decision:—That the child had been mature and viable; 2. that it had lived after its birth; 3. that it had died of apoplexy very shortly after its birth, and 4. that there is the very highest degree of probability for supposing that this apoplexy was produced by the extreme severity of cold when the child was born, and while it lay naked."

CASE CCCXXII.—DOUBTFUL CASE OF DEATH FROM COLD OF A NEW-BORN CHILD.

A mature male child, unclothed and rolled in rags, had lain one whole lay among the snow, in which it was found in the evening. Although putrefaction was already far advanced, the results of the docimasia pulmonaris permitted no doubt to exist as to the child having lived after its birth. The body was already greenish-grey, the cuticle in many places peeled off, the trachea brownish-red from putrefaction, the lungs, at their bases, beset with putrefactive bullæ, crepitated but were very anæmic from putridity. Both sides of the heart, but particularly the left, still contained a tolerable quantity of half-coagulated blood. The vena cava also contained a tolerable quantity of blood. The other abdominal organs revealed nothing of importance. The brain was changed to a putrid pulp, the sinuses empty. We gave it as our opinion, that nothing could any longer be with certainty determined regarding the kind of death from which the child had perished; that it must have been dead some time before it was laid amongst the snow, and that most certainly it had *not died of cold*, since it was impossible for putrefaction to set in among the snow, least of all that it could in one day have advanced so far. Undoubtedly this child, already dead for some time, had been placed in this position, either to conceal its birth or to save the expenses of burial. Neither the mother nor the circumstances connected with the birth and death of the child have ever become known.)

Case [illegible].—Probable Death from Cold.

In February, 18—, during very severe cold, a woman, aged fifty-five, was found upon the ice dead and stiff. There were no traces of injury to be found upon the body, except numerous scratches and recent sugillated abrasions on the knuckles of almost all the fingers, when we dissected it five days after its discovery. The brain was half frozen, the cerebral veins and all the sinuses were only moderately filled, and by no means hyperæmic. The lungs were normal in every respect, the trachea empty and pale, the right side of the heart moderately full of blood, the left one distended. The blood was not any longer frozen and was quite natural. The liver contained a moderate amount of blood, the stomach was stuffed completely full of potatoes, the urinary bladder was filled with fluid urine, the kidneys and spleen were normal, the omenta were unusually fat, the ascending vena cava much congested. We gave it as our opinion, that the deceased had died from cardiac apoplexy, that this form of death might possibly have been produced by cold, but that more probably it was produced by some convulsive attack with which the deceased had been seized while passing over the ice. (The excoriations on the fingers were most naturally explained in this view of the case, by supposing that the woman, suddenly seized and thrown down by an epileptic attack while upon the ice, had thrown her arms convulsively about her, as is usually the case, whilst these trifling injuries remained quite inexplicable by supposing that she, perhaps while drunk, had fallen asleep upon the ice and thus perished from cold.)

Case CCCXXIV.—Death from Cold of a New-born Child.

In this case, on the other hand, we did not hesitate to assume death from cold as more probable than from any other cause. This was another new-born (female) child, that was found dead and frozen stiff in a loft, naked, merely rolled in hay, one February, when the temperature ranged from — 9° to 10° R. = 11°.75 to 9°.5 F. during the day, and from — 14° to 16° F. = — 0°.5 to — 4° F. during the night. The mature child had lived after its birth. At the institution of the docimasia pulmonaris the heart was found to be of the remarkably great and unusual weight of about 1 oz. 13.5 drs. (imp.). All its cavities were, however, distended with dark and partially frozen blood. The lungs, also, which were of the considerable weight of about two ounces and a-half (imp.) were very full of blood. The larynx and trachea were pale and empty. Of the other appearances I need only mention, a considerable hyperæmia of the liver and vena cava and within the cranium. We decided, 1. that the child had been mature; 2. that it had lived after its birth; 3. that it had died from cardiac and pulmonary apoplexy; 4. that this form of death might possibly have arisen from internal causes, but that, 5. it was more probable that it had been produced by cold.

CHAPTER VIII.

DEATH FROM CHLOROFORM (ANÆSTHETICS).

STATUTORY REGULATIONS.

The statutory regulations in regard to poisoning in general (Vid. p. 18, Vol. II.)—Circular Rescript of the Minister for Medical Affairs, dated 30th of August, 1850:—"For the prevention of accidents which may arise from the administration of chloroform, as well as because the chloroform in trade does not generally possess the necessary purity, I ordain, in accordance with the opinion given me at my request by the Technical Commission for Pharmaceutical Affairs:—1. That chloroform is not to be dispensed unless it possesses the following properties: it must be transparent, colourless, entirely volatile, and free from hydrochloric acid; when dropped into pure sulphuric acid it must not discolour it. It must possess a specific gravity of 1.459 to 1.500 at 17°.5 C. = 63°.5 F. Until the manufacturing chemists send out pure chloroform, the apothecary must purify the present commercial chloroform by agitating it with water, pouring this off and rectifying the chloroform over chloride of calcium, and the apothecary must [illegible] if necessary. The price of pure chloroform from the 1st of October of this year till further notice, is fixed at 1 sgr. 3 pf. the drachm (nearly 1½d. for about 2 drachms, imp.). 2. The chloroform is to be kept in the drugshops with the same precautions which are ordained in regard to the so-called drastic remedies (Vid. C. Pharm. Bor. ed. vi.). 3. Chloroform for medical purposes is only permitted to be retailed to the public by the licensed apothecaries, and then only upon the written prescription of a qualified medical practitioner."

§ 64. GENERAL.*

I have already in § 29 of the Special Division (p. 45, Vol. II.)

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* I consider chloroform as here representing all the known bodies belonging to the class of anæsthetics, ether, chloric ether, nitric oxide of ethyl,

enumerated chloroform as a nerve-paralyzing poison. It produces a paralysis of the central organs of the nervous system by means of a direct poisoning of the blood. All that is known in regard to the inhalation of chloroform in the living, as well as in regard to its fatal effects, both in human beings who have accidentally perished, and in animals who have been intentionally killed, justifies the placing of chloroform under this head. Its power of rapidily depressing the vitality of all the nerves of sensation, half-paralyzing them, has procured it, and secured to it its position as an anæsthetic. The effect which its inhalation has in relaxing the voluntary, as well as the involuntary (hollow) muscles of the womb and heart, also proves its depressing half-paralyzing power upon the motory nerves. When the limits of this action are overstepped, death, sudden as the lightning's flash, ensues, as is the peculiarity in regard to all nerve-paralyzing agents. Finally, the—upon the whole—negative results of the dissection, prove the death to have occurred from neuroparalysis. If now the subject of death from chloroform, over and above the cursory notice it has already received under the head of poisons, obtains here a larger share of attention, it is because of its great medico-legal interest. I myself have already had occasion officially to investigate the first (and so far as I know the last) case in Germany of death from chloroform in which a dentist was blamed (*Vid.* Case

benzole, aldehyde, *elaychlorür?* amylene, &c. The first case of death from amylene occurred in England on the 7th of April, 1857. It is related by Snow, in the Med. Times and Gazette, 1857, No. CCCLV., p. 379. The patient was a healthy man, aged thirty-three, who was amylenised when about to undergo an operation for *fistula in ano*, and died with the usual symptoms of death from chloroform. The results of the dissection (forty-eight hours after death) were as follows:—"Cadaveric rigidity. Much subcutaneous fat. The costal cartilages ossified. The lungs large and not collapsed. They completely distended the thorax, and seemed to be emphysematous, although no large vesicles were visible on their surface. The inferior surface of the left lung was somewhat congested (!), otherwise they were not very vascular. There was a little serum in the pericardium. The external surface of the heart was very fatty; the heart itself was somewhat larger than usual. It was removed from the body after the large vessels had been cut across at this entrance (!!), by which three or four ounces of blood escaped. The right ventricle was somewhat dilated, the heart was otherwise healthy. The walls of the left ventricle seemed very thick, but it was so completely contracted, that the cavity was almost obliterated. The liver was congested, dark-coloured, and friable, the stomach was healthy, and contained only a small quantity of mucus. The other organs were not examined (!)." There was no smell of amylene in the body.

CCCXXVIII.)* From the extended use which the remedy has obtained, cases of this sort must not only be expected to occur more frequently, but cases of accident and doubtful suicide, many of which have been already observed, and even murders perpetrated in this novel and only too easy mode, may all test the skill of the medical jurist.† I will, therefore, now relate what my own observation, and the collation of all the known fatal cases ‡ teaches in regard to the diagnosis of this form of death, and what we are to base our opinion upon: in the first place, however, I will relate the results of these experiments which I performed upon rabbits, which, however, I by no means regard as decisive.

§ 65. Experiments on Animals.

1. A young rabbit was completely anæsthetised in one minute by holding over its mouth and nose a cloth upon which about one drachm (imp.) of chloroform had been poured. In all the three cases the animals were made fast by the ears and hind-legs, and care was taken that no pressure should be made upon the neck, so as to meet the objection that suffocation might possibly have caused the death.§ The animal again revived, and it required a fresh dose, which proved rapidly fatal, death being preceded by a brief whimpering and by convulsive movements of the tail and hind-legs. All the three animals were dissected immediately after death, in order perfectly to avoid the very slightest obscuration of the appearances by commencing putrefaction. There was no smell of chloroform in any part of the body. The lungs were much collapsed, quite remarkably anæmic, and of a bright palish cinnabar-red. The trachea and larynx were perfectly empty, of a corpse-like pallor, and displayed not a trace

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* Upon death from chloroform, with the communication of a new case, in Casper's Wochenschrift, 1850, No. 1, &c.

† In March, 1850, a Berlin dentist, oppressed by misery and want, killed his wife, his two children, aged ten and eight years respectively, and himself, with chloroform.

‡ Cases of death from chloroform, by Dr. Nicholas Berend. Hannover, 1850, 8. I have here made use of only the twelve cases related in the First Part of this work, partly because it seems very doubtful if the others are attributable to the mere use of chloroform, and partly because they are quite incorrectly observed.

§ Was ist der Chloroformtod und wie ist er zu verhüten? by Dr. Stanelli. Berlin, 1850, 8.

of froth. The large blood-vessels contained very little blood. The heart, which still exhibited feeble tremulous movements, was not collapsed, its coronary vessels were tolerably congested, its four cavities were, however, empty. Within the cranium also the anæmia was remarkable, both in the cerebrum and cerebellum, and also in the sinuses. The liver was pale and anæmic, the gall-bladder filled. The vena cava ascendens was full but not distended. There were no air-bubbles either in this or in any of the other veins. The urinary bladder was full. The spleen was rather pale than hyperæmic, both kidneys contained but little blood; the mucous membrane of the stomach (distended with food) and of the intestines was pale. The blood was remarkable by its cherry-red colour; I may add, that about half-a-drachm (imp.) of blood escaped at opening of the body.

2. The second rabbit was chloroformed in the same way; in half-a-minute a similar whimpering was heard, and similar quiverings of the tail and hind-legs observed, and death occurred in about one minute and a-half. Dissection:—There was no smell of chloroform in the body. The brain and the sinuses were quite as remarkably empty of blood as in the first case. The lungs were collapsed, contained more blood than in the former case, and were of a dark violet colour marbled with bright red. The heart, which also still trembled, was not collapsed, its coronary vessels were empty, in the left there was a small quantity of coagulum, the right one was empty. The blood throughout the body was of a distinct cherry-red and treacly consistence. The tracheal cavity was quite pale, empty, and perfectly free from froth. The liver was very anæmic, its gall-bladder very full; the spleen and kidneys were anything but hyperæmic. The vena cava contained no air, it was moderately full of blood, the urinary bladder was empty, the stomach and intestines as in the former case, the mesenteric vessels anæmic.

3. The third rabbit was, after one minute and a-half, still unanæsthetized. Its breathing was hurried, it whimpered like the others, immediately before death it moved the right hind-foot convulsively, and died after three minutes and a-quarter. Dissection:—Here again there was not even a trace of the smell of chloroform. The blood was cherry-red and treacly. The right lung was collapsed, the left, however, reached to the heart; they were of a faint violet colour, their edges whitish. Although the lungs in this instance also contained more blood than those of the rabbit first experimented on, yet the amount of blood contained in them, even in the two latter cases, was very insignificant.

The tracheal cavity displayed no vascular injection, it was pale, empty, and contained no froth. The heart was not collapsed, its coronary vessels were empty, as was also the right half, whilst the left contained a small amount of coagulum. The blood-vessels were here distinctly hyperæmic. Within the cranium the anæmia was as complete as in the two previous cases. The liver was not hyperæmic, the gall-bladder was distended. The spleen and kidneys were normal. The vena cava contained a moderate amount of blood and displayed no air-bubbles. The urinary bladder was distended almost to bursting. The intestines were pale, the large ones were distended with fæces. The pale stomach was distended with food. The mesenteric veins were quite empty.

One must confess that the results of these three experiments when summed up were extremely negative. Besides some unimportant and individual peculiarities, only two appearances were common to all the three cases, the exceedingly remarkable anæmia of all the organs, and the cherry-red colour of the blood. Still less were there any air-bubbles found in the veins, while these have been observed in human bodies, and have also been seen in one such case by myself, but to this subject I will return; neither were these bubbles found by F. Hartmann in any of those rabbits which he killed by chloroform. Just as little did the dissection of any of our rabbits reveal even but one of the appearances peculiar to death from suffocation, which Stannelli assumes to be the form of death produced by chloroform.* Truly the objects of the experiments were animals, but retrospective conclusions from animals to men are more admissible in this than in many other questions, and the dissection immediately following the deed makes the results always instructive and useful.

§ 66. Diagnosis.

In the present empirical condition of the matter, we must, alas! confess, that the diagnosis of death from chloroform is to be determined rather from the circumstances preceding the death than from the appearances found in the body. When a man has died while under the influence of chloroform during an operation, or at any other time, as for example, while carelessly taking the remedy himself, either quite suddenly, or so that death has been preceded from one to ten minutes by uneasy respiration, rhonchus, paleness of the countenance, escape of froth from the mouth, convulsive extension of the limbs, collapse, complete unconsciousness and loss of sensation, retardation of the pulse and beat of the heart, while, more rarely, these symptoms of depression are preceded by excitement, often of the most violent character, then we must conclude that *chloroform has killed him, so long as the contrary is not more probable nor can be made evident.* Since a critical examination of all the existing reports of dissection after death from chloroform, shows that the result upon the whole has been more negative, though in some there were differences deserving of attention, that consequently, not much is to be relied on any decided appearances in the body, and this all the more that the histories of such dissections are not only as yet far too few in number, but are also far from being as correct as could be desired. For instance, the degree of freshness or putridity of the body is never mentioned, consequently, as may be supposed, it has not been sufficiently attended to by the dissector, and for this reason all dissections hitherto reported are at least but doubtful, and little to be depended upon. On the other hand also, when the twelve published cases, carefully collected by Berend, are compared, it is evident in them also, as in so many other medico-legal dissections, purely cadaveric phenomena have not been recognised, estimated and separated from the actual results of the poison. When, for instance, we read "both lungs were very hyperæmic, *particularly posteriorly*," or "the lungs were '*inferiorly*' hyperæmic," or "congested particularly inferiorly," every expert sees at once that this is only the usual pulmonary hypostasis of constant occurrence erroneously described as a specific appearance. Precisely the same is the case in regard to the "congested condition" of the cerebral veins, which are never found quite empty in any body except where putrefaction is already complete, and in which, as we may daily see from the reports of dissections, the cerebral hypostasis is so frequently erroneously assumed to be a specific state of congestion. In two other (English) reported dissections, mention is made of a "port-wine-coloured congestion" of the tracheal mucous membrane. We must be careful, however, not to mistake this discoloration for a congested condition of the organ, since, as I have already (p. 44, Vol. I.) fully detailed, it is nothing else than the product of putrefactive imbibition, the tracheal mucous membrane becoming affected at a very early period after death, and long before there is any very evident appearance of putridity visible externally. The same may be said in regard to another (English) case, in which it is reported that there was "a port-wine-coloured congestion of the external covering of the intestines and congestion of the gastric veins." Here we have quite a distinct portrait of the putrefractive changes which are seen daily in all bodies after every possible kind of death. Alas! one of the two cases which have come before my personal observation, and which shall be related presently, was also that of a body already far advanced in putridity, and we were obliged to state at the time in delivering our official opinion, that the influence of the putrefactive process upon the phenomena observed could not be exactly determined, and that it must certainly be taken into account.

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* Beitrag zur Literatur über die Wirkung des Chloroforms. Giessen, 1855, s. 14.

In this state of the matter, the following may be regarded as *at present* in some measure determined in regard to the appearances on dissection; it must, however, remain for the future, by enriching our experience, and by spreading abroad the knowledge of the phenomena of putrescence and their proper estimation, to give us more exact knowledge in regard to the nature of death from chloroform.

1. *The blood* in most cases in men, and in the three rabbits dissected by us, while quite fresh, is found to be of a dark, "black," or cherry-red colour, and more or less fluid than usual. In the twelve cases collected by Berend (inclusive of the one published by myself), this condition of the blood was found no less than ten times, whilst in two of the cases the state of the blood is never mentioned. Also, in the case related by Binz,* the blood was of an "intensely dark red," in that by Prichard,† "dark." And also in the other less evident or less correctly observed cases, the cherry-red colour and peculiar fluidity of the blood is repeatedly mentioned. The observations on men thus confirm the statement, though not the words, of Velpeau, Girardin, Varrier, Gruby, &c., who stated that they found the blood of animals poisoned by chloroform to be arterial, even in the venous system, that is brighter coloured, though it actually bespeaks a constant greater so-called carbonisation of the blood. The two cases about to be related which occurred to Langenbeck and Dohlhoff are very instructive in this respect, inasmuch as, during the chloroform-narcosis in life, as well as at the dissection after death, an "inky fluid," or a "dark fluid" blood has been observed. This phenomenon then may be regarded as almost constant; it is not,

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* Deutsche Klinik, 1858, No. 13.

† Schmidt's Jahrbücher, &c., 1858, No. 7, s. 32.

however, specific, but occurs after other kinds of death, particularly after many kinds of poisoning. We have not found any microscopic alteration of the blood in Case CCCXXV.

2. In none of the other reported dissections is there any mention of any *remarkable anæmia* of the body, such as we found in our Case CCCXXVIII. (even after due consideration of the possible share which the putrefaction might have had in producing it!), and in all our three rabbits. When, however, we consider what our experience has taught us in regard to the so-called "congestions," and then compare the various histories of the dissections, we are led to the conclusion, that in the bodies of those killed by chloroform there has been found rather a deficiency of blood than the reverse, certainly than a condition of hyperæmia.

3. *A smell of chloroform* has been twice observed in the eleven cases (exclusive of mine) collected by Berend. I have already stated, that no trace of this smell was found in the bodies of the rabbits which were immediately examined, neither have I observed it in the bodies dissected by me. Seiffert * also has never been able to discover the smell of chloroform in the course of his experiments on animals, either in the blood or in the milk, &c. This phenomenon is certainly not one to be depended upon.

4. *The larynx and trachea* were described, three times out of eleven cases, as having their mucous membranes more or less injected, besides the "port-wine-coloured" congestion already referred to. In our three experiments no trace of any such injection was found, but it was seen in our Case CCCXXV. In several of the published cases the tracheal canal is never mentioned. Stanelli lays great stress upon this symptom, and deduces from it that death from chloroform is produced by suffocation. Even, however, if this injection were more frequently observed than has been actually the case, we should not be justified in deducing from it the fact of death from suffocation, since every other appearance denoting death from asphyxia, in all its various modifications, is absent in this form of death, and since, from the well-known irritant action of chloroform upon all the mucous membranes, its excitant influence on the mucous membrane of the respiratory organs, which reacts so instantaneously and so violently against any other excitant than atmospheric air, is very easily explicable by attributing it to the inhalation of so powerful an irritant.

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* Canstatt und Eisenmann, Jahresbericht, &c. Erlangen, 1849, s. 173, &c.

5. *Air-bubbles in the blood* have been found by myself in one of my medico-legal cases, in the others not, and they have also been described as found in three cases out of eleven. Prichard saw "tolerably numerous air-bubbles" in the veins of the pia mater, and Holmes,* who has collected the histories of thirty-nine dissections, reports that in three of them the blood contained air. It is well enough known, that as gases are developed by the putrefractive process generally, so also in the decomposed blood of putrefying bodies gases are developed which are distinctly seen within the veins in the form of air-bubbles interrupting the column of blood. Therefore, in the first of my medico-legal cases, that of a highly putrid body, I had, from the novelty of the matter, to leave undetermined the possible share of the putrescence in producing this phenomenon. The three other cases elsewhere related also give rise to the same doubt. In one case (at Paris) the death occurred on the 26th of May, the dissection took place twenty-seven hours after death, and the "putrid condition and smell of the body" are expressly mentioned; in the second case (at Langres in France) the chloroformed woman died on the 23rd of August, in the heat of summer consequently, and the body was not opened till thirty-three hours after death: nothing is more consistent with experience than to suppose that already a considerable amount of putrescence existed in such a body, even although nothing was said of it. The third case, finally, occurred in winter, that of an Englishwoman who died while under chloroform on the 23rd of February, and was dissected twenty-six hours after death. In this case, indeed, no putrescence is to be presupposed, and we can only regret that nothing is said as to the condition of the body, which may, for instance, very possibly have lain in some warm place. It is certain, however, that at least there was no *general* putrescence in either of the two cases about to be related (§ 67), which occurred to Langenbeck and Dohlhoff, in both of which the blood was found to contain air-bubbles. After what we have just said, the following statements by Stanelli, in regard to this question, must appear remarkable:*—"Since bubbles of air have been seen escaping from the cut veins and arteries of those operated on while under the influence of chloroform (?), so it seems possible that in the case of over-saturation of the organism with chloroform, it may readily escape from the

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* Schmid's Jahrbücher, 1859, No. 3, s. 305.

† *Op. cit.*, s. 5.

blood within the vessels in a gaseous form, and prove fatal by mechanical disturbance of the heart's action, as is the case with air-bubbles of any character which get into the circulation. When I permitted rabbits to inhale the concentrated vapour of chloroform for some time, so that their respiration speedily became hurried, they began to cry violently, and then ceased to breathe; and if a short time thereafter I opened the thorax, I then found a quantity of air-bubbles in the blood, with which the heart was copiously filled, and which gave to the transparent auricles the appearance of an emphysematous lung. I also several times observed within the coronary vessels of the heart small pearl-like air-bubbles, strung together, and separated by minute quantities of blood, and which could be moved backwards and forwards by external pressure. I cannot say positively that these bubbles were formed by the vapour of chloroform; I have not been able to decide this by their smell. If, however, the thorax were not opened till after the lapse of twenty-four hours, I never found any trace of air-bubbles, but at the most, only larger or smaller coagula within the heart. On the other hand, if a rabbit were only permitted to inhale chloroform vapour, mixed with atmospheric air in such proportions that it gradually became insensible, and was then brought into such conditions that it must die from embarrassment of the respiration, on the heart being then laid bare, I never found any air-bubbles within it." In our experiments already described, the vapour of chloroform was indeed employed "mixed with atmospheric air," as is always the case during surgical operations, when, as generally happens, the anæsthetic is poured upon a sponge or towel and held before the nose and mouth, both were therefore so far in unison. In the opposite case, where "concentrated chloroform vapour" is administered, it is said that a dissection immediately instituted reveals the presence of air-bubbles in the blood, while, when it is postponed for twenty-four hours, no trace of them is visible. It is not easy, however, to see how or in what manner vapour which has once been in the heart and veins is to disappear from them within twenty-four hours?

In the present position of the matter as just described, and in accordance with what the published cases of dissections and my own experiments have taught me, I must, till further information is obtained by observation and experience regarding these air-bubbles in the blood, hold to the opinion that this phenomenon is mainly attributable to the putrefactive process, *which seems to set in particularly* *early after death from chloroform, and to decompose the blood first of all, and previous to attacking any organ;* from this we can understand how decomposed blood containing air-bubbles has been found even in bodies still fresh.

6. In the twelve cases (inclusive of my first one) collected by Berend (*op. cit.*) *the heart* is described as having been ten times found "flabby," empty, collapsed, "doubled over;" and in Berend's other cases mention is frequently made of a flabby, collapsed heart. I found the same appearance in my second (Case CCCXXVIII.). Binz describes the heart of the body dissected by him as "flabby, pale and empty." This appearance, therefore, is one of the most constant and most deserving of attention. This appearance cannot in any wise be reckoned amongst the phenomena of putrefaction—though it was remarkable that in none of our experiments, in which the dissection took place immediately after death, was there any collapse of the heart found—since an actual collapse of the walls of the heart flat on one another, as I myself found them in both of my two cases of death from chloroform, is never found after death from any other cause, even in corpses already far advanced in putrefaction. It must be confessed that the hitherto relatively frequent observation of this peculiar phenomenon seems to support very strongly the theory of the cause of death from chloroform already propounded.

7. As yet little or nothing has been decisively determined with respect *to the condition of the lungs.* In regard to my own experience, the lungs in the body first dissected, as well as in all the three rabbits, contained but little blood, while in the second case, they were hyperæmic. If we compare the other cases, we find the lungs described in one-half of them as anæmic, and in the other half as in a congested condition. I have, however, already mentioned how incorrect these descriptions are, and how these nominal congestions are very probably nothing else than pulmonary hypostases.

Finally, as to the question whether chloroform can be *chemically* discovered in the blood of men and animals killed by it, which would indeed be the most certain of all forensic means of detection, I have the authority of my well-known colleague, E. Mitscherlich, for stating that it cannot be done. Our judicial expert, Dr. Hoppe, has also, after repeated experiments, arrived at the same conviction. I must therefore hesitate to accept as correct the statement of Dr. Jackson, that he found the blood of a woman decomposed by the fatal dose of chloroform, the terchloride of formyle being changed into formic acid, which he procured by distillation. The chlorine had united with the blood, which was said to have thereby lost its power to coagulate and to redden on exposure to the atmosphere.*

§ 67. Continuation.—Chronic Chloroform-poisoning.

A woman was chloroformed on the 12th of December, previous to the amputation of her left leg on account of a comminuted fracture, and up to the hour of her death, on the 23rd of the same month, she had never completely recovered her senses, lost during the inhalation.† I then took occasion, in the work already quoted,‡ to point out, in connection with this case, the occurrence of *a chronic chloroform poisoning*, which would present new difficulties to the medical jurists, in the event of any cases coming before them. Subsequently, after the occurrence of several similar cases in operative practice, this opinion has been embraced by others, and at present the possibility of the action of chloroform ending fatally after the lapse of some time can no longer be denied. When, however, it is occasionally difficult to determine whether the usual sudden death in any given case is to be ascribed to the anæsthetic, or to the important injury received, or it may be to the severity of the operation, &c., how much more difficult may the task become when many whole days have elapsed since the inhalation, and when many other causes have been at work, as so frequently happens after important surgical operations, the possible fatal influence of which by themselves cannot be denied!

The two following cases (not my own), of which I quote the most important particulars, I have borrowed from Berend's work, as they supply not only well-observed proof of such chronic chloroform poisoning, but also two hitherto unused (in this work) histories of dissections.

1. Giersch. A house-painter, aged thirty-six years, and addicted to drinking, was admitted drunk on the 5th of February, 1850, into Langenbeck's clinic in this city, with a swelling the size of a child's head, and distinctly fluctuating, upon the left shoulder. It was punctured, and about two quarts of fluid evacuated. The next day, (6th of February) L. decided upon removing the degenerated

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* Archiv der Pharmacie, 1857, Februar, s. 211.

† This case, which is here omitted, may be found detailed at p. 356 of the earlier (German) editions.

‡ Wochenschrift, *loc. cit.*, s. 58.

shoulder-blade, although the patient seemed exhausted, with a small pulse at 110, and was otherwise restless. The operation was performed under chloroform, and lasted for three-quarters of an hour. The inhalation was always stopped whenever complete narcosis set in. Thrice L. observed the sudden occurrence of an *inky colour of the blood* in the wound, and immediately interrupted the inhalation of the chloroform. Complete consciousness followed the completion of the operation. Motion and sensation were completely restored. The pulse was tolerably full and 120. Vomiting suddenly occurred in the evening, and recurred during the night on swallowing fluids. On the morning of the 7th of February, the face was pale, the pulse small and very frequent, the vomiting continued; at eight o'clock the pulse suddenly ceased, the movements of the heart could scarcely be felt, the respiration free and regular, yet the patient complained of oppression. An attempted venesection gave vent to a little *watery, ink-coloured blood.* The man died a little after eight in the morning, *seventeen* hours after the operation. The dissection was most carefully carried out, and its most important results were the following :—Moderate cadaveric rigidity, paleness of the body, consequently the body was still fresh (in February). From the sinuses of the dura mater, when cut across, there flowed about four ounces (imp.) of fluid, warm (?), ink-coloured blood. There was no smell of chloroform in any part of the body. The veins of the pia mater were filled with fluid blood, but *contained no air-bubbles;* the cerebral membranes were moderately vascular. The cerebral substance was peculiarly pale (lead-coloured), and here and there quite anæmic; its consistence was normal, the choroid plexuses thickened. Upon the pericardium there was a thick layer of fat. In the left side of the heart there was a large black, feebly coagulated, friable clot. From the cardiac veins black watery blood escaped, here and there mixed with a quantity of *air-bubbles.* In the *ramus longitudinalis* of the *vena magna cordis* there was a column of blood, much interrupted by air-bubbles strung close to one another. In the right side of the heart and in the large vessels there was much blood collected, partly fluid, partly in the form of a loosely coagulated homogeneous clot. The heart was pale, and though not distended, was by no means collapsed or flabby. The lungs were distended, pale and anæmic; blood in the condition already described, and also mixed with many air-bubbles, flowed copiously from the veins and branches of the pulmonary artery. Similar blood could also be copiously expressed from the incised portions of the lungs, and out of the pulmonary vein and branch of the pulmonary artery supplying those portions uninjured. The blood in the liver, spleen and kidneys displayed the same distribution and qualities. The organs pale, and the larger branches of the blood-vessels distended with black, watery blood, containing air-bubbles. Even the larger venous trunks of the extremities displayed interspersed air-bubbles. The spleen was dense and firm; the liver fatty; the kidneys pale and firm. The stomach was much distended, its mucous membrane pale, softened, and hypertrophied in a mammillary form.—Langenbeck remarks upon this case, "that the fatal result of the operation could only be explained in two ways:—1. By supposing an over-excitement and subsequent exhaustion of the nervous system by the operation; 2. Or by a fatal after-effect of the chloroform, a chronic chloroform poisoning."

2. **Reineke.** A railway-labourer, twenty-three years old, came into Hospital at Magdeburg on the 6th of January, 1849, labouring under an inflammatory affection of the bones of the right tarsus. After vain endeavours to remedy this, while the hectic continued to increase, the deceased Dohlhoff decided at last upon the necessity for amputation of the leg, which was performed under chloroform. It was full twelve minutes before the patient became completely unconscious, he having been at first uproariously excited. Subsequently, he cried out at every cut. On tying the arteries, a convulsive tremor of the stump took place. The amount of blood lost at the time, and at two secondary hæmorrhages which ensued during the course of the day, was not sufficient to produce exhaustion. Yet the stump was five times during the day seized with tetanic convulsions. The last attack, accompanied by general spasms, proved fatal *eight hours* subsequent to the operation. The body, which was (of course, it being January) quite fresh, was dissected sixteen hours after death. Within the cranial cavity there was a considerable congestion of the vessels and the cerebral substance; in some of the veins there were a few *air-bubbles.* The lungs were not œdematous, but contained much blood. The blood was fluid and dark-red. "There was otherwise throughout the whole body, which displayed nothing else anormal (even in the kidneys), such a remarkable degree of anæmia, that no blood was found in any of the vessels nor in the cardiac cavities. *The heart itself was remarkably flabby.*" Dr. O. Fischer, who has published the case, supposes death to have been caused by apoplexy of the brain and lungs, and goes on to say: "We cannot, however, deny that all the chief indications of death

from chloroform came prominently before us at the dissection: the dark-coloured blood containing air-bubbles, though scarce a trace of putrescence was visible, and the flabby heart. The dark condition of the arterial blood had also been observed *during life*, and the long time during which the inhalation had been continued supplied a favourable condition for the production of this form of poisoning. But one main requisite for the entertaining the supposition of the occurrence of this death from chloroform was wanting, namely, the suddenness of the death. Casper, however, has now (1850) pointed out the persistent action of the drug, and speaks of a kind of chronic poisoning. And we may also, in our case, impute some influence to this persisting action of the inhaled poison developing a subsequent paralysis of the circulatory organs."

We here see death occurring in certain and incontestable causal connection with the inhalation of chloroform; in the first case after seventeen hours, in the second after eight hours, and in our own case, mentioned above, even so late as eleven days. Among the cases collected by Berend, which are, indeed, not at all correctly observed, there are many other similar cases in which death followed the use of the anæsthetic during the ensuing night, after fifteen or forty-eight hours. After this relatively frequent experience, it can no longer be doubted that there is such a thing as *chronic* poisoning by chloroform; that is, that the drug when it does kill, does not always kill instantaneously, but that hours, days, or even weeks may elapse, during which the person anæsthetised remains continuously under the influence of the poison to which he at length succumbs. This doctrine is obviously of medico-legal importance. We may suppose an accusation directed against an operator for the careless and unscientific use of chloroform, even though the patient may have died long after its inhalation; the foregoing cases would tend to support such an *accusation*. Or, on the other hand, we may imagine a surgeon accused of having operated inconsiderately and unscientifically on a patient while narcotised by chloroform, being acquitted of all share in the death, because the person operated on has lived for hours, days, or weeks subsequently. In this case, *the defence* will find the same support in those similar cases of death occurring at a late period.

§ 68. The External Conditions favourable to Death from Chloroform.

It is not only a matter of the greatest scientific, but also of practical judicial interest, that the external conditions and circumstances which favour this peculiar form of death should be accurately investigated; in regard to these, alas! there is but little known with any certainty. It is manifest, that a correct knowledge of these conditions could alone permit any certain decision to be come to, in the case of an accusation against a medical man for killing his patient by the careless use of chloroform. These conditions are obscure and peculiar indeed, as may be gathered at once from the simple statement, that of every ten, or, perhaps, of every hundred thousand persons chloroformed, under, on the whole, tolerably similar circumstances, only one dies.* The following is all that is already known in regard to this matter:—

1. The differences in the *preparations* employed is never so important that, in accordance with all analogy with other poisons, any important influence can be ascribed to it. Moreover, according to the statute already quoted (p. 282, Vol. II.) a general uniformity of the drug is to be supposed to exist at least in the apothecary shops of the Prussian monarchy, and with us it is unlawful to procure the drug from any other source.

2. *The dose* of chloroform employed, is another question which comes to be considered especially in medico-legal cases. Where, in regard to imprudence in the dose, does the punishable carelessness of the physician or surgeon commence? Alas! in regard to this nothing is determined. In the case which came officially before us, there were administered at three different times, first, twelve to sixteen drops of chloroform; the same a second time; and the third time, only from four to five drops, and death followed. This is the smallest fatal dose that I have observed in all the published cases of death from chloroform, in which the doses amount to one, two, or three drachms, and in one case, two doses, each of half-an-ounce, &c. Christison even reports an accouchement case, in which the parturient woman lay narcotised for thirteen hours, and in which eight ounces of chloroform were used without damage either to the mother or child,

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* One single dentist in Berlin chloroforms several thousand patients yearly, and has not yet met with one single case of accident.

and I myself have in a few cases of severe operations in the hospitals here, seen frightful doses of the drug employed to produce long-continued stupefaction, without any fatal result. It is therefore absurd for Blandin, Guérin, and Roux to teach* that the dose of chloroform must be modified, and the "normal dose" and duration of the inhalation lessened in women, children, feeble persons, and in those afflicted with disease of the lungs and heart, &c., since no one can as yet say what the "normal dose" is, and since it is generally known that dentists and surgeons daily employ this drug without any scrupulous care, and by no means measured by drops, without any fatal result.

3. *As to the posture or position* of the individual while inhaling the chloroform, this, too, does not seem of importance. The greater number of fatal cases have happened in those half-lying or sitting during the operation. But what an innumerable multitude have been, and are daily chloroformed throughout Europe in this position without any fatal result! We are very properly warned against chloroforming a patient lying on his abdomen, because, unless carefully watched, he might, while senseless and stupid, sink into the pillow and become actually suffocated. In the case of operations, however, that require this position, careful attention and support to the patient will certainly render it not more dangerous than any other; and, without doubt, many patients have since the discovery of this anæsthetic just as fortunately survived operations in this as in any other position.

4. In respect to the most convenient, that is, least hurtful *method of employing* chloroform, it seems to be distinctly ascertained that its inhalations must be interrupted. By means of frequently interrupting the inhalation, Gruby succeeded in maintaining dogs and rabbits for many hours in a state of anæsthesia without injury, whilst the animals died if the inhalation were continued uninterruptedly for only from one to four minutes, as happened in our experiments already related, in which the inhalations were also continuous.

The Parisian Academy also teaches in their deliverance about to be quoted, that the inhalations must be interrupted. Yet our Berlin lady died after the third application, and Samuel Bennet after the second, two hours subsequent to the first.† In the case (CCCXXVIII.) which came officially before me, the operating dentist had used a sponge on which to apply the drug; others have employed peculiar inhaling apparatuses. Blandin, Roux, and Guérin think these ought to be preferred; when we consider, however, that a mixture of chloroform vapour with atmospheric air is universally acknowledged to be necessary for its inhalation, and that by far the larger number of patients have been successfully chloroformed without any peculiar inhaling apparatus, but simply with towels and sponges, we see there is no reason for preferring the use of any apparatus.

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* Gazette médic., 1849, p. 63.

† Berend, *loc. cit.*, s. 15.

The Academy of Medicine at Paris has made the investigation of the mode of action of chloroform the object of their discussions, and it formed the subject of lively debate during ten meetings. At the public meeting on the 31st of October, 1848, the report of the Commission appointed to investigate the matter was received, in which the following prudential regulations for the use of chloroform were recommended; the use of which was said to ensure "perfect certainty" (??); they are as follow:—

"1. The inhalation is to be stopped or withheld upon the ascertaining of any contra-indication, as disease of the lungs or heart, and it is specially necessary to determine the healthy condition of the organs of respiration and circulation. 2. During the inhalation care must be taken that the vapour of chloroform is sufficiently mixed with atmospheric air, and that the respiration continues free. 3. The inhalation is to be at once stopped when anæsthesia is complete; it may be recommenced during the operation, if necessary." To these regulations the Academy subsequently added the following:—

"4. Chloroform is not to be used pure (?), nor in too large doses.

"5. The chloroform is only to be employed after digestion is completed, in order to avoid the disturbance of that function."

In the year 1857, the Academy again made this matter the subject of lively debate, and specially considered the best mode of employing the drug. It conclusively adopted the dogma, that in the present condition of the science of anæsthesia, this may be produced just as well without as with an apparatus, and that the choice of the procedure must be left with the medical man.*

In the foregoing, I believe I have detailed, as far as is as yet possible, everything which can be of service in aiding the medical jurist in regard to this new mode of violent death, and have thus attempted to supply a hiatus in modern forensic medicine. In regard to the general question of blame attributable to the medical man when he is accused of carelessness, as was the case in our case, I shall treat of it more at large in the next Chapter.

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* Schmidt's Jahrb., 1858, No. 3, s. 302.

§ 49. Illustrative Cases.

Case CCXXV.—Suicide by Chloroform.

A merchant, about twenty years old, a handsome, powerful, and healthy young man, said one evening that he would chloroform himself for toothache, and next morning he was found dead in bed with his clothes on. On a chair by the bedside there was a little bottle still containing one ounce of chloroform, but which had contained three ounces. The body held in its right hand a pocket-handkerchief before its mouth and nose, and lay thus with its face upon the pillow. The dissection was made sixty hours after death. The body had lain for the last thirty hours in the cellar of our institution, and yet the abdominal coverings were already (at a temperature of — 3° R. = 35°.75 F. in December) of a deep green, although internally the putrefactive process had not yet advanced so far as to interfere with the natural appearances. There was not a trace of the smell of chloroform in any of the cavities. The veins of the pia mater contained only their usual amount of blood. Neither in them nor in the tracks of the jugular veins, nor in the brachial vein of the right arm, which was laid bare, were there any air-bubbles. The brain presented nothing abnormal; the sinuses were only moderately filled. The blood was in this case also remarkable, namely, syrupy, and of a very dark cherry-red, but displayed *no microscopic alteration.* Upon this dark colour of the blood depended the peculiar appearance of the lungs, which were almost of a violet-blue, with a few scattered bright-red patches. They were much congested with dark blood. In the trachea, in spite of the commencement of putrefactive imbibition, vascular injection could be distinctly traced; moreover, its cavity contained the regurgitated remains of food. The peculiar appearance of the heart was not wanting in this case. The large sized heart was quite empty of blood, and lay not only flaccid and collapsed, but as it were somewhat folded together within the pericardium. The pulmonary artery was empty. The liver and kidneys were also stained by the peculiar colour of the blood, but they were anæmic, as was also the vena cava. The stomach was almost empty, and displayed nothing remarkable, as neither did any of the other organs.*

For another case of death from chloroform, *vide* Case CCCXXVIII.

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* After the above was written, a third case of death from chloroform came before us. A quack dentist killed his pregnant sweetheart with chloroform, and then shot himself. The results of the dissection of this girl, aged twenty-eight years, were exactly the same as in the above (CCCXXV.) case. There were also no air-bubbles in the blood. The folded-together appearance of the empty heart was almost exactly like a photograph of that of the Pharmacist.

SUPPLEMENT.

UPON INJURY AND DEATH, SAID TO BE CAUSED BY UNSCIENTIFIC MEDICAL PROCEDURE.—MALAPRAXIS.

STATUTORY REGULATIONS.

PENAL CODE, § 184.—*Whoever causes the death of an individual by carelessness, is to be punished by imprisonment for from two months to two years. When the culprit was by his office, calling or profession specially bound to employ that care and attention, which he omitted to do in regard to the homicide by neglect, then he may either be declared unfit to hold such an appointment for a definite period, which must not exceed the term of five years, or he may be for ever deprived of the right to hold such an appointment, or to exercise independantly his profession or trade.*

IBIDEM, § 198.—*Whoever by carelessness inflicts bodily injury upon an individual or injures his health, shall be punished by a fine of from ten to one hundred dollars* (£1 10*s. to* £15), *or with imprisonment for not more than one year.—This punishment shall only follow on the complaint of the person injured, except when the bodily injury shall have been severe* (*Vid.* § 193 [*]), *or where it shall have been inflicted by the infringement of official or professional duty.*

IBID. § 199.—*Whoever, for pecuniary reward, without being regularly licensed, or in defiance of a police prohibition, undertakes the cure of any internal or external complaint, or the treatment of a midwifery case, shall be punished by a fine of from five to fifty dollars* (15 *shillings to* £7 10*s.*), *or with imprisonment for not more than six months.—This regulation does not apply to the treatment of an urgent case where no regular medical aid can be procured.*

IBID. § 200.—*Medical men who, without adequate cause, refuse*

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[*] That is one which "injures or destroys the speech, sight, hearing, or capacity for procreation," of the person injured, or produces in him any "affection of the mind."

their assistance in cases of urgent danger, shall be punished with a fine of from twenty to five hundred dollars (£3 *to* £75).

IBID. § 340.—*With a fine of not more than fifty dollars* (£7 10*s.*), *or imprisonment for six weeks, those are punishable:* 1, *&c.;* 7. *Whoever in the case of accident or public danger, or calamity, gives no assistance when requested by the police magistrates or their deputies, although he might have complied with the request without any great danger to himself.*

IBID. § 201.—*Midwives, who neglect to call in the assistance of a licensed accoucheur, when circumstances arise during an accouchement which threaten danger to the life of the mother or child, or when the life of either of them is actually lost, shall be punished with a fine of fifty dollars* (£7 10*s.*), *or with imprisonment for not more than three months.*

IBID. § 203.—*In the case of any intentional bodily injury, where the culprit has exceeded the duties which devolved upon him in consequence of his office, calling, or profession, he may either be declared unfit to hold such an appointment, for a definite period, which must not exceed the term of five years, or he may be deprived for ever of the right to hold such an appointment, or to exercise independantly his profession or trade.—Also, where bodily injury has been caused by carelessness, the culprit may be punished for neglect of those duties belonging to his office, calling, or profession, which are at fault, either by being declared unfit to hold such an appointment, for a definite period, which must not exceed the term of five years, or he may be for ever deprived of the right to hold such an appointment, or to exercise independantly his profession or trade.*

§ 70. GENERAL.

We come now to the most difficult part of the duties of a medical jurist, viz., the determination of injuries to the health, or actual death, said to have been caused by unskilful action or injudicious omission of the necessary interference on the part of any one engaged in treating a sick person or parturient female, and this person may either be a medical man, that is, an individual who, by reason of having finished his studies and passed his examinations, has been declared by the State to be qualified to afford assistance in fitting cases, and indeed to be bound in duty to do so; or he may be an individual wholly devoid of any such qualification, and who, therefore, acted from the first without any legal authorization. In the first instance, the accused may be a medical man, who has received the fullest permission which the State can grant, a license qualifying for the exercise of every duty which can devolve on a medical man, or he may be one who has only undergone a restricted examination after but a limited course of study, and received a license restricted to certain branches of the healing art, the limits of which he has exceeded in the case upon which the accusation is based. Such cases, which are by no means of infrequent occurrence, in the case of barber-surgeons of the lowest class, and of midwives, belong to quackery in medicine in its widest sense; or the case may belong to quackery in medicine in its most restricted sense, when the accused has received no medical education, and is either wholly without any state license for attendance upon the sick, upon persons wounded, or upon parturient females; or as, alas! happens even in the best organized states, when he has only received a license to attend the sick in a certain definite and limited character, as for instance, for the treatment of sores or dislocations, &c., with a certain salve, or for the purpose of magnetising them, &c., and this pseudo-physician has overstepped the limits of his license. For in all these cases the medical jurist may be called upon by the civil or criminal Judge to determine the existence or non-existence of any pretended injury to health or life. Whoever has learned by many years' experience as a medical jurist, how often perfectly groundless accusations of this kind are made both against medical and non-medical men, dictated by ignorance, by wrath at a supposed overcharge for attendance, or in other cases entirely by a contemptible love of gain, in order to wrest from the pretended injurer some compensation far exceeding any actual or pretended injury, will always exercise the greatest care in making his examinations, and the utmost caution in coming to a decision upon the facts; and he will be still more led to this by a consideration of the many other serious difficulties which encompass the whole matter in so many of these cases!

We do not now speak of *crimes* perpetrated by medical men. Dr. Castaing, of Paris, and W. Palmer, of England, both practising physicians, acted not as physicians, but as murderers, when they poisoned their friends, Ballet and Cook, and they received their well-deserved reward in capital punishment. The so-called medical blunders we are now to speak of, arise either from carelessness or ignorance. Acknowledged law authorities exclude the latter entirely from all penal recognition, and for all offences against science, caused by it, inflict only disciplinary punishment. This is a legal controversy, which forensic medicine has nothing to do with, and, we repeat it, ought to have nothing to do, either with it or any other juridical controversy. We shall, therefore, also take care not to bring forward the purely juridical expressions, *culpa* and *dolus*, however fond other treatises on forensic medicine are of making use of them in treating of these matters. (Let a medical man but once make use of any such juridical expression before the Court, and he will be immediately, and rightly, set down!)

As to "*carelessness*," however (taken in its widest sense), a medical man may become guilty of it by sins of commission as well as by those of omission, and therefore malapraxis has been correctly divided into active and passive. We, however, entirely disagree with the opinion of an older teacher (Henké), when he says, that the sins of omission of medical men are more easily decided upon than those of commission. Any such doctrine is, alas! in our day no longer good in law. For, on the one hand, that enormous sin of omission, called Homœopathy, and the Water Cure, which at least excludes all other means and methods of cure, have not only forcibly possessed themselves of all the privileges due to them in the right of co-equality with Hippocratic medicine, but have also obtained an acknowledgment of their existence from the state, which is of importance as regards the medico-juridical view to be taken of their sins of omission, since, as systems, they are thereby removed from the cognition of the penal code: while, on the other hand, in recent times, a new school of medicine has arisen, which, placing the science of medicine far before its practical application, sets an undue value on the healing powers of nature, which they forbid to disturb by the administration of drugs. So, now-a-days at least, it is more difficult for the medical jurist to decide in any given case that there has been any error of omission than that there has been one of commission, for in the former case the defender of the accused may dispute the decision in the simplest possible manner, and one, too, which does not admit of any satisfactory opposition by a reference to these newer systems and methods of cure. For it is an invincible difficulty in the way of a medico-legal decision in such cases, both for the physician himself, and also for the medical boards, that there is neither any general law, any legal rule for the procedure of physicians, any overstepping of which would be at once evident; nor can there, nor will there ever be, any such general law; and the reasons for this have been so often detailed, and are so clear and evident, that we shall not repeat them.

§ 71. CONTINUATION.—THE STATUTORY REGULATIONS.

The physician had, not only in olden times but still more now-a-days and in modern states, an exceptional position in the organization of the commonwealth, and one, truly, anything but enviable. He is loaded with all the obligations and burdens of a state official, without enjoying any of his rights and privileges! He resembles an official, in that the state requires him to pursue a strictly-defined system of education, both preliminary and otherwise, to submit to examinations, to take an oath, to acquire a qualification, to adhere strictly to certain (medical) statutes issued for his behoof, in that, when it assigns to him the care of certain sick, it obliges him to accept of a price, fixed by the state, as a reward for his services, and also, in that it obliges him, in cases of "urgent danger," to appear at the first call, &c. In none of these regulations is the character of the physician, as a private professional or trader, if we may call him so, recognised. On the other hand, the state does not grant him, like his fellow-officials, a fixed salary, an invaliding pension, a relative rank, &c., and in *this* respect the physician is nothing more to the state than any other private individual who cares for his own as he best will and can.

No one will consider it any offset to this mongrel position of the physician, that he is (in Prussia) exempted from the degrading trade-tax, that he is—yet only *pro bono publico*—permitted to decline all civic offices, or, finally, that his claims are allowed a preference in a court of bankruptcy. Moreover, the construction of the penal code has made the position of the physician a widely different one from that of any other class; and, as we shall point out, the new penal code has made it still more serious.

In the older, and now obsolete, penal code (GENERAL COMMON LAW, Part II., Tit. 20) there were no peculiar penal regulations for breach of duty by medical men—(under this head, of course, we do not reckon the statutes against medical quackery which the common law contained)—and the general penal statutes (*loc. cit.*, §§ 691, &c., §§ 1105, &c.) were all that the Judge had to guide him in accusations of this character. This is not the case, however, with the new penal code, whose regulations (already quoted) we have to consider.

It is indubitable that medical men are threatened by the penal regulations contained in § 184, since a physician *can* "cause the death of a man by carelessness," and when he has had this great misfortune, it is he, peculiarly, that "was *specially bound by the nature of his office, profession, or calling,* to exercise that *care and attention,* which he has omitted to do in the case of homicide by neglect." An architect, a builder, or a house-carpenter, may all come under the operation of the same statute, since they also are "specially bound to exercise care and attention" in the discharge of their "calling," and by the careless omission of this they may cause, not the death of one man only, but of a great many men at once. But "architects and builders" are specially mentioned in § 202, while physicians are not so, but are, as it were, grouped along with teachers of swimming, railway contractors, engine-drivers, cab-drivers, proprietors of a circus or rope-dancing establishment, upon all of whom, as may be readily inferred, the paragraph referred to must find an eventual application! Meanwhile, in spite of the statute book, an implied derogation of dignity may be got over, but actual penal regulations take a deeper hold. And here we must first point out, that in consequence of the abrogation of the ancient doctrine of degrees of lethality in the Prussian and all the more recent penal codes, the physician, in the case of a homicide by neglect, can no longer plead in his own behalf the so-called individual peculiarities of the deceased, nor the fact that other patients have been preserved alive by the same treatment blamed in the case in question, nor any of the possible so-called accidents, since, according to the penal code, "in determining the fact of a death, it does not fall to be considered whether the fatal issue of an injury might have been prevented by timely and *judicious* aid, or whether any similar injury has been in other cases cured by the aid of art, or also whether the injury has only produced a fatal result by reason of any peculiar bodily condition of the person killed, or by reason of any accidental circumstances under which it was inflicted." I myself have already had a case coming under the new penal code, respecting a physician who was accused of having carelessly killed, by a surgical operation, a patient in the last stage of an absolutely fatal disease; my opinion in this case, that the operation had only hastened the death, which, even without it, must have ensued in a very short time, was refused by the public prosecutor, and I was asked categorically,—Has, or has not, the operation which is blamed, occasioned the death of this patient? thus, of course, bringing the case expressly under the operation of § 185, which no longer recognises any individual peculiarities in persons killed. The question next arises whether this regulation of the new penal code, in regard to fatal injuries is also applicable to bodily injuries which do *not* end fatally? This question, which also occurs in relation to malapraxis, shall be entered upon more at large in the Biological Division of this work.

There is still another point in regard to which our new penal code has deteriorated the position of the physician. Even under the Roman law a patient, when he considered himself injured by his physician, might raise an action for damages against him, and this *modus procedendi* has been retained in all later legislations. Now, however, § 198 of the penal code ordains that the punishment of any one accused of producing any bodily injury through carelessness (possibly, therefore, a medical man) shall only take place on the complaint of the person injured, "*except in the case of severe bodily injury*, or where the injury has been produced by *exceeding the duties obligatory on any office or calling*." Since this statute comes into operation in the case of merely a severe injury, how much more likely is it to do so in the case of homicide by neglect! The "except," however, in opposition to a *private* complaint, means, of course, nothing else but that in the last-mentioned cases the *public prosecutor* shall take up the case. When, therefore, a physician has met with this so oft-mentioned misfortune, and humanity, compassion, thankfulness for former assistance, aversion to a public trial, &c., restrain the "severely injured" person, or, it may be the surviving relatives, from lodging any complaint against him, the public prosecutor *must*, according to § 198, take their place, and bring an action against the "negligent physician." Here we see the legislator threatening the physician with a novel sword of Damocles, when he, as it were, sets the public prosecutor at his heels!

Meanwhile, all these regulations only excite the physician to redoubled vigilance and more sharp-sighted attention in the discharge of his calling, and this conduct is, in the end, as good for the physician as for his patients; so that all these regulations are for him as if they were not, and neither trouble nor annoy him; yet, finally, the penal code brings forward another quite new regulation, which places the medical man in a perfectly unheard-of exceptional position to all other classes of society, and will often enough force an honest man to dishonest evasions to protect himself from the action of what I do not hesitate to call a much too severe and unreasonable law. I refer to § 200. "Medical men who, without *adequate cause*, refuse their assistance in a case of *urgent danger*, shall be punished with a fine of from twenty to five hundred dollars (£3 to £75)." The health of the soul is a far more valuable possession than that of the body; but the penal code does not threaten an (evangelical) clergyman with a fine of five hundred dollars, when he; without "sufficient cause," refuses at once to respond to the call to administer the holy supper to a person supposed to be, or actually dying. Yet the clergyman is not dependant on his profession like the physician, but is rewarded for the exercise of his duties from state patronage, or communal funds. The care for one's family when in the jaws of death is the holiest feeling of either heart or conscience in every father of a family. But the penal code does not threaten a lawyer with a fine of five hundred dollars when, without "adequate cause," he refuses at once to respond to the call of one supposed to be, or actually dying, to come immediately and draw up his testamentary depositions; and clergy and lawyer alike can, at the most, be only called up and reprimanded. But the medical man, subject to the penal code, must, at every hour of the night and day, in all weathers, through snow and ice in the winter, through flooded fields and meadows in spring, hold himself at the command of any one, any one who fancies himself in "urgent danger," at the risk of a statutory fine, which, perhaps, may amount to all his annual earnings, if it do not exceed them! Not to mention the classes above spoken of, I may ask, upon what other trader has the law made a similar demand? Every old and experienced physician that knows the whims of the upper classes, and the ignorance of the lower ones, will agree with us. Who has not, in the course of a long medical practice, been called up a hundred times during the night, always under the pretence of "urgent danger," to see some patient, a perfect stranger to him, whose own medical man lived too far off, which may mean, in large towns, only a few streets off; who has not been called off at some unseasonable time for him, because the "urgent danger" of an attack of croup required his immediate attendance upon a child who had coughed once or twice, with somewhat of a hollow sound? How many actually comic adventures could not every medical man of some standing relate, were not the matter so bitterly serious! When, in the one case, convenience dictates that Dr. A. should be called, so in another, celebrity decides the matter; and every "dangerously" ill person has, at every instant, recourse to the much sought-after Dr. B. Must he, or can he, attend to all these requests, even should he only have the human requirement of some recreative relief from overwhelming business, and actually no other cause for refusing attendance? And what right has the state to demand from a medical man, whom, as we have pointed out, it does not recognise as its official, that he, living by his profession, should never *rest* day or night from its exercise?

We would not have mentioned these ominous paragraphs here at all, were they not connected with the duties of a medical jurist. For even though on the occurrence of any given case, the Judge considers himself authorized to decide in regard to the "sufficiency of the cause," of the refusal of any medical man, yet he must, of necessity, leave the interpretation of the most important clause of the statute to the medical jurist, and must hear his opinion, as to whether there was in the nature of the case any "urgent danger"? And this can, in regard to the application of the penal statutes, only then be supposed to exist when *from the bodily condition of one still alive, his death could, for scientific reasons, be reasonably supposed to be at hand.* The statements of the sick person, or the non-medical bystanders will, of course, seldom or never afford any basis for an opinion, which must rather be deduced, when required, from an examination of the *status præsens,* and the conclusions which may be drawn from it as to the patient's former condition, from the history of the case as given by the physician subsequently called in; or possibly from the history of the dissection of the deceased, when it is necessary to determine whether, at the time the accused medical man was requested to attend, "urgent danger" was actually present.

From the above definition it will be seen that a medical man will have done no wrong, when he (who does not know that this actually happens!) has been called upon, in haste, to visit a *dead person,* and has refused. The following case is an interesting commentary upon the clauses in the penal code referred to, and forms too remarkable an example of the extraordinary combinations which are found in real life, to be here omitted.

A respectable surgeon to the poor of this town was placed at the bar, charged, under § 200, with having refused attendance upon a case of "urgent danger," because of an attack of rheumatism in his right arm. The case was this:—A workman had hanged himself in his cellar in the middle of summer, on the 21st of July, between six and seven o'clock in the morning, and after he had hung some time, he was cut down. At seven o'clock, a police-officer called upon the accused, and requested him to come to where the deed was done, as fast as possible, because the unfortunate man was still "warm and limber." Dr. X. refused, because he did not consider himself required to attend upon such cases; further, because this was his hour for receiving patients, and also because he suffered from rheumatism. Another medical man called in about the same time, opened a vein in the person hanged, and had him well brushed, &c., but all attempts at rescuscitation failed, precisely as the surgeon had foretold. At the time of trial the accused gave the same exculpatory reasons. At the same time, I stated orally, as required, that hanging was one of the speediest possible kinds of death, and that the accused, from the time already elapsed, had a perfect right to suppose that the man would be dead before he could see him, which actually was the case. But he had all the less call to go to a dead person, who no longer could be said to be in "urgent danger," in that he had duties to perform to living patients; and the condition of his right arm—which was ascertained from his medical adviser—was such as would, moreover, have incapacitated him for carrying out any attempts at rescuscitation which might possibly have been required. The circumstance communicated to him that the body was still warm and limber, could not be employed to his prejudice, inasmuch, as every expert knows that cadaveric stiffening never comes on immediately after death, and that neither does the natural heat of the body immediately cease, &c. Accordingly, the public prosecutor himself moved for a verdict of not guilty, which was pronounced by the court in respect of § 200. Meanwhile, the penal code also contains § 340 (quoted at p. 303, Vol. II.) which may be applied to medical men! And the court decided that the accused's rheumatism could not have been so severe as to have been much aggravated by his going out on a summer-day, that Dr. X. could, therefore, have gone the short distance "without any great personal danger," and condemned him therefore, in accordance with § 340, to a fine of from seven to twenty dollars (£1 1*s*. to £3), or ten days imprisonment!!

§ 72. Imputation of Malapraxis.

The penal code everywhere speaks of "carelessness," and also of a carelessness increased by breach of duty, but without defining what it is, for which, moreover, in regard to medical men, it had all the less occasion, inasmuch as they are not particularly mentioned. But even had this been the case, the legislator would scarcely have taken occasion to define it more exactly, as for instance, he has afforded an inkling of in regard to builders, when in § 202, he threatens with punishment all proceedings "contrary to *the generally recognised rules of architecture.*" For it did not escape him that there were no "generally recognised rules of therapeutics," at least none applicable to every single case. We have already pointed out (§ 70) why we hold it to be superfluous to reproduce the oft-repeated reasons well-known to everyone against the construction of a medical statute book for the regulation of medical therapeutics. Everyone is convinced of the propriety of this omission, but all are not agreed how such medical transgressions are best to be opposed. A short and comprehensive dogma has not yet been discovered suitable for all general purposes, and which might serve to regulate the decision in any given case; there are, therefore, no general rules for the determination of the medical neglect, by which a man may be said to have been killed or injured, and each individual case must be judged according to its own merits. This will always continue to be the rule for each decision, as indeed the consideration of each individual case on its own merits is, and must ever be the fundamental guiding principle of the medical jurist. But, it is not to be supposed, that all the difficulties of the subject are thereby disposed of. The Judge never expects, in the case of any accusation of this character, the expert associated with him to give him his own *individual* opinion, but that in this, as well as in every other case, he will base his statements upon the general principles of his science. Could now any such general principle be laid down, its practical advantage would be incontestable. I have attempted it in the following. In the first place, fully recognising all the severity of our penal code, there can yet be no doubt that bounds must be set to the free exercise of the medical art. A diploma is no free pass to ramble at discretion in the realms of poisons and sharp knives. A medical man has an indubitable right to require that, besides the traditions of the schools, his own *experience,* his own professional *talent,* and his own *conscience,* shall be admitted and respected as efficient guides for his conduct. Experience itself, however, alas! has shown that the meaning it conveys is abused and falsely understood, that vanity imagines a talent which does not exist, that conscience is an ample cloak, that gross ignorance, the desire to shine, to attract attention, and thereby to win a position, which in the right way is not so easily attained, and many other temptations react upon the practice of the medical man, to the great detriment of the public weal. When a physician prescribes for a child one year old half-a-grain of opium every hour, when a surgeon in operating for empyema punctures the abdomen instead of the thorax, when an accoucheur performs the Cæsarian section where the conjugate diameter of the pelvis amounts to three inches and a-half, and when the sexual parts are otherwise healthy, or, as in a horrible case that has been related, cuts off a loop of intestine prolapsed through a laceration of the uterus in mistake for the umbilical cord, of course no good defence can be made for the accused, and the medical jurist can have no difficulty in coming to a decision. But the case is not always so plain, particularly in the case of the accusation of actual physicians (treating internal disease), when the difficulties and uncertainties of the diagnosis, the disobedience and imprudence of the patients, the degree of carefulness of the apothecary, the differences of views in the medical schools, the appeal to isolated similar cases which have recovered, which in the great proportion of cases is always possible, and many other points which may by chance be brought forward for the defence, and may thus prepare a very difficult position for the medico-legal boards sitting in judgment. This leads us once more to consider the appeal to medical systems, or so-called systems, one of the most difficult points in the whole question.

§ 73. CONTINUATION.

How far may a physician, in an accusation of malapraxis, exonerate himself by an appeal to his "system"?* Medicine as well as science requires the setting up of systems, and in the course of its development of course of ever newer systems. And so long as a medical system continues to give a scientific explanation, hypothetical interpretation of natural phenomena, it must maintain its position in the interest of *scientific development.* But the *practice* of medicine is an art, the *practical* physician is an artist, and he must and ought, in accordance with the requirements of the public weal, which the state protects by its penal code, in the midst of his system recognise its *limits,* and always have them before him. These limits, however, are nothing else than the eternal laws of nature, and of general medical experience. No one dare deny the existence of either of these laws, and when the system which he follows does so, then he must choose in the interest of the public weal, whether he will as an enthusiatic partisan of a system oppose them, or whether, as a true artist, he must respect them. Both homœopathy, therefore, and hydropathy, if they must be recognised as authoritative systems, must be left perfectly free to consider whether they will accept the unalterable consequences of supposing that under all possible circumstances every other remedy or mode of cure, except homœopathic dilutions or cold water, is to be utterly rejected, even, for example, in important arterial hæmorrhage. When, however, a homœopathic or hydrophathic physician in any given case sees his patient slowly bleeding to death before his eyes, he must either abandon his system, because he must know that death must ensue if means are not adopted unrecognised by his system, or he must retire, and hand over the patient to another medical man; he must either abandon his system or the patient. Guided by this principle, I did not hesitate to assume in the following shocking case, which came before me for decision during the time of the old penal code, that the hydropathic physician had been guilty of "gross carelessness," as defined in the statute.

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* It is evident that in this we do not overstep the province of the medical man, since upon this very question he will be always consulted by the Judge.

In April, 18—, a married woman, E., determined to employ the water-cure, on account of headaches of many years' continuance; the treatment, however, gave her no relief. On the 2nd of September, in the same year, she was seized with what was supposed to be, and what the accused, Dr. N., called a "nervous fever," which he treated by the constant application of cloths wrung out of cold water, and in fourteen days he said it was removed. The patient's feet, nevertheless, continued swollen. In order to remove this swelling, Dr. N. made the patient sit with her feet upon a stool, and ordered that cold water should be poured upon them *continuously* day and night. The complaints that the patient could thereby not get one instant's sleep all night, that the cold affusions produced the most violent pain, though the family assured him that this was at times so violent that the cries of the patient could *be heard upon the street*, that the patient was losing strength from the continuance of the pain, and the *absolute want of sleep* for six or eight days, could not induce Dr. N. to accede to the wish of the family, and try some other remedy; he rather laid so much stress upon the continuous employment of the cold affusion, that the members of the family in order to keep it up day and night were obliged *to relieve each other regularly*. A black spot now appeared on the little toe of the right foot. For several days running the woman's husband pointed out this appearance to the accused, but he as constantly affirmed "it was of no consequence." The black patch extended over all the toes of the foot. The woman E., therefore sent again for Dr. N., and once more directed his attention to the foot, whereupon he exclaimed, "that it was inflamed in the highest degree, but his prescriptions must just *be continued as formerly*, he knew of no other remedy." Meanwhile, as the foot grew rapidly worse, the woman E. consulted Dr. D., who requested Dr. T. to be associated with him, and they together declared that both feet were affected with gangrene, and that the life of the patient was in danger. The water-cure was laid aside, and a rational mode of treatment entered upon. Forty-eight hours subsequently, a line of demarcation had formed, and in a few weeks the violence of the fever abated, and all the toes of the right foot came away of themselves without any difficulty. In consequence of the long confinement to bed, and the depressed condition of the nervous system from the abuse of the water-cure, I found the ankle-joint of the woman quite stiff and immoveable at my official examination three-quarters of a year subsequently. All the toes of the right foot were lost and the wounds healed. The process on the left foot was not, however, quite finished, and it seemed quite probable that the quite black (gangrenous) first joints of all the toes would be subsequently lost, which was actually the case. From this description it is apparent that the married woman E. was maimed for life. I deduced from these circumstances that the accused water-cure doctor had been guilty of "gross carelessness" in the sense of the then penal code. Another medical board, consulted at the request of the defendant, was of a different opinion. They assumed that the original disease of E. had actually been a nervous fever, and that the gangrene of the feet might *possibly* have been a consequence of that fever, and not of the hydropathic treatment. The accused was therefore acquitted.

The comprehensive dogma above alluded to, which is still wanting as a guide to medical jurists in deciding upon the accusations made against medical men, is as follows:—*Any injury to the health, or any death proved to have occurred subsequent to medical (surgical or obstetrical) treatment, is to be imputed to the physician, when his treatment has been quite different from what is taught orally and in books by his acknowledged scientific compeers as the proper treatment, according to the rules of art, for such a case, or one similar to it, and which is universally acknowledged by the medical experience of his compeers to be correct.* This dogma seems to approach this most difficult subject. It comprehends every possible accusation against the treatment of physicians, surgeons, and obstetricians, whether it belongs to any specific mode of cure, or to general Hippocratic medicine, and thus gives a general rule, as it were, for the guidance of the medical jurist. In individual cases, well known to present such innumerable varieties, this must be modified, as we shall presently show. In such cases, the Judge may possibly, according to the replies obtained to the following queries, feel himself induced to admit the existence of "mitigating circumstances," and thus then the judicial treatment of these ominous accusations differs in nothing from that of all the others.

There is, however, one objection to our rule that *appears* to be correct; it is this, that if it were of general practical application, bounds would be set to the advancement of medicine as an art. When individuals are bound only to act as has been hitherto taught, are not the wings of true genius thereby clipped? How shall the art then progress? Jenner, then, acted "negligently," because he acted differently from what had been, up to him, the mode prescribed by the recognised scientific teachers of his day? Not so, if we do not merely hold to the words. We here deal exclusively with the *unfavourable* results of medical treatment, *for such alone, and not the favourable ones, form the subjects of complaint, and the objects of this great inquiry.* In an empirical science, such as medicine, it must remain free to every medical man, from the observation of the natural phenomena, from the results of the modes of cure hitherto employed, from the conclusions which induction or analogy justify him in drawing, &c., to make a fresh step in practice, and institute an experiment with a new remedy, or a new mode of performing an operation, &c. But he must most carefully consider the probable results of his experiments in accordance with the scientific reasons and data given, for he does not experiment *in anima vili*. We all know how Jenner came to the conclusion to inoculate men with the cow-pox. Should, however, the experimenter neglect this prudential care, and make wild experiments with remedies and knives, be they never so rash, and should *then* the result, as may readily happen, be *unfavourable,* our rule just fits the case; and who could, in such a case, deny the error in practice? Should, however, the experimenter not have strayed from the ways of science, nor neglected the prudence necessary to be observed in pioneering a path as yet untrodden, and is the result, as may be hoped, *successful,* then he has to expect (if not always honours or gratitude!) at least, certainly no *complaint*. From the relations of the medical art and its followers, however, the immediate and necessary result of his discovery will be, that the procedure will be at once adopted by the larger proportion of all medical men, and taught as the correct mode of treatment. As instances of the correctness of this view, I may mention, among many others, which have occurred during the present century, the employment of vaccination, and of quinine, the non-mercurial treatment of syphilis, tendo-section, chloroform, &c.

The tribunal of the "medical experience of ones contemporaries" will, consequently, be recognised by every one as the definitive one, since in the totality those deficiences and errors, as ignorance, the desire to shine, rashness, &c., under which individuals may labour, disappear, and it must be supposed that most medical practitioners and teachers hold fast to science, and experience tried and proved as the only correct and profitable guides. Thus is formed the continuously developing school of general medicine of all civilized lands and peoples, whose laws are binding upon each individual, and must be recognised as such.

In the formal treatment of such cases, which often exactly coincides with the real, it may be remarked that the Judge either places certain questions before the physician for his reply, or he asks him quite generally, whether the accused, in his treatment of the maimed or deceased N., can be charged with "carelessness?" The latter is generally the case according to my experience. The physician, or the medical boards, are then put in the unpleasant position of being obliged to express their opinion as to the purely juridical idea of "carelessness." In order as much as possible to avoid this, one should always put before himself those general questions which belong solely to the province of medicine, and have reference to every possible case of the kind, and having given his opinion upon these, he ought to reply to the Judge's query exclusively as follows: that (consequently) in the opinion of the referee, there is (or is not any) ground for supposing the existence of "carelessness." These questions, however, which are not rendered superfluous by the regulation of the new penal code already (p. 302, Vol. II.) detailed, since it is the duty of the physician to unravel each individual case from his point of view, and to place it before the Judge for his judicial decision; these questions are as follow:—1. Does general medical experience warrant the supposition of any causal connection between the medical (or surgical) treatment, and the injury to health, or death, which has followed? For example, could certain fluids injected into a blennorrhagic urethra produce a urinary fistula?—2. Should the answer be in the affirmative, then, has it been the case in this instance, or is not the unfavourable result rather to be ascribed to other causes than the treatment blamed? Examples of this are given in Cases CCCXXVII. and CCCXXIX. related below.—3. Has the treatment followed and blamed in this instance been *not* followed in similar cases with the like unfavourable result? Here the complete impartiality of the referee, and his entire abstraction from his own individual views of practice, come into full play. He may bleed his pneumonic patients over and over again, but he must know that recognised authorities reject venesection as useless in this disease, and he will not reckon the death of an unbled pneumonic patient as the crime of the physician in attendance. He may support the perineum in every labour attended by himself, but he must know that this assistance just as little necessarily prevents, as the non-support necessarily occasions, rupture of the perineum; and with such an opinion the Judge will not hold an obstetrician, who has left a woman in labour, to be responsible for a rupture of the perineum which has taken place during his absence, as we, ourselves have experienced. But, on the other hand, the expert will never have to say that the cutting off of a prolapsed piece of intestine in mistake for the umbilical cord has *not* caused death; or, that the complete omission to replace a dislocated thigh-bone, &c., has been followed by *no* injury to the patient, &c.—4. Independent of the general medical experience as expressed in the writings and teachings of his contemporaries, has it been allowable for the accused medical man, in virtue of his " system," whether he has embraced a peculiar or more general one, and in virtue of the experience he is said to have gained in this system, to treat the patient (or parturient female) as he has done? I have already dilated upon this query at p. 313, Vol. II. In regard to the injuries to life or limb caused by unskilled medical treatment, or the injudicious omission of treatment, the result of *medical quackery*, which have become the object of an accusation, the decision respecting the injury is to be arrived at only in accordance with the principles just laid down. Moreover, the determination of medical quackery, as such, is scarcely a part of the duties of the medical jurist, and is only so in right of his police duties. For, in order to discover whether any one has been empowered by the state or not, " without being regularly licensed, to undertake for reward the cure of external or internal disease, or the treatment of an obstetric case" (§ 199 of the penal code), or if he, being licensed, have, perhaps, exceeded the limit of his authority, we only require to obtain a sight of his license. The Prussian medical organization has carefully sought, for more than a hundred and fifty years, to watch over the canker of medical quackery. It is left for the progress of civilization in future times wholly to eradicate it.

§ 74. ILLUSTRATIVE CASES.

CASE CCCXXVI.—PRETENDED POISONING BY THE CARELESSNESS OF A PHYSICIAN.

A boy, one year and a-half old, was said to have died from " quinsy," but according to the accusation made by his father, he was said to have been poisoned by his medical attendant, and this was certified to the father, by a second physician, called in shortly before the child's death (very fraternal!). The dissection revealed the existence of a broncho-pneumonia. The cavity of the trachea and all the bronchial ramifications were completely filled with thin, green, purulent matter. The mucous membrane of the larynx and trachea was indeed pale, but a few rosy-red patches of vascular injection were visible on them. The inferior lobes of both lungs were in a state of red hepatization, contained much blood, were condensed, though they were were still capable of floating. The brain contained much blood. All the other organs were perfectly healthy. The stomach, the duodenum, and a piece of the colon were preserved for chemical examination; after they had been opened and examined according to rule, they displayed nothing remarkable however.

Dr. X., the medical man in attendance, had diagnosed the existence of croup, and upon the certificate of death he had named "pellicular quinsy" as its cause. On the 1st and 2nd of December, he had given one grain and a-half of sulphate of zinc every ten minutes, twelve grains in all; and besides that, on the 2nd of December he had also given nine grains of sulphate of copper within an hour, in grain and half doses, and on the same day other nine grains, altogether eighteen grains of sulphate of copper in one day. But the child did not die till the 13th of December, that is, from eleven to twelve days after the so-called poisoning; and this was an important circumstance as well in respect of the anatomical condition of the stomach, as in regard to the estimation of the result of the chemical analysis.

According to the circumstances of the case, the œsophagus, stomach, and duodenum had to be examined for the salts of copper, zinc, and antimony (since, in the course of the disease, tartrate of antimony had also been administered). These organs were cut in pieces and mingled, and one-fourth part of the whole taken for a first examination. A mixture of twenty parts of distilled water with ten parts of hydrochloric acid, and one part of chlorate of potash, was poured over this, and the mixture boiled till the solids were dissolved and the whole had become a thin and almost transparent fluid. This fluid was strained, and after the addition of a little more chlorate of potash, it was heated till all smell of chlorine had disappeared, and then filtered. After the fluid had cooled, ammonia was added to it, till its acid was almost entirely neutralized, and a current of sulphuretted hydrogen passed through the transparent fluid. There was no deposit of any sulphuret of any metal either immediately or even after the mixture had been set aside in a warm place till all smell of sulphuretted hydrogen had disappeared, but only a trifling precipitate of sulphur. The filtered fluid was completely neutralized by the addition of ammonia, and hydrosulphuret of ammonia added to it. The copious black precipitate which resulted, was dissolved in nitro-hydrochloric acid, and again decomposed by the addition of ammonia in excess. A yellowish-white precipitate resulted, this was removed by filtration; the filtrate was tested by sulphuretted hydrogen but not a trace of sulphuret of zinc was found. The yellowish-white preciptate was discovered, upon more careful analysis to be a mixture of oxide of iron, phosphate of lime and clay. The other three-fourths of the mingled organs were then examined in a similar manner, but the result was the same, and also negative. *The intestines therefore contained not a trace of any salts of copper, zinc, or antimony.*

This case presents several points of interest. In the first place, it gives a new proof of how even relatively large doses of so-called poisons—the dose ingested was, in this case, accurately known!—can in no long time be so completely excreted from the body, that the most accurate chemical investigation, at least of the *primæ viæ,* is perfectly incapable of detecting one single atom of them in the body, although we had in this case, moreover, to deal with "poisons" which are so easily detected. In the second place, the case is certainly an instructive contribution to the history of poisoning with copper, which, specially in regard to its admixture with food, and its use in the arts, has been recently combated for such important reasons, by Paasch, Toussaint and Pietra-Santa;* for it is just as indubitable that this child was not poisoned by copper, as it is incontrovertible, that even where there has hitherto seemed to be reason for supposing that individuals have been poisoned by food cooked or allowed to cool in copper, or badly-tinned copper utensils, it is but seldom, if ever, that any one has at such a meal ingested as much as eighteen grains of a salt of copper (here this was done by a child one year and a-half old!). In the third place, the case was interesting as an instance of an accusation of malapraxis with fatal result. And, in regard to this, I thus at once expressed myself to the Judge conducting the investigation, on sending the report of the chemical analysis:—"The post-mortem appearances have also confirmed, in its most important particulars, the diagnosis made by Dr. X. as to the disease under which the child laboured, inasmuch as they have proved that it had suffered from an inflammation of the air-passages, and 'pellicular quinsy' is precisely a disease of this character. 2. Dr. X., as proved by the recipes contained in the documentary evidence, has only used such remedies as are daily employed by physicians in the treatment of this disease, and though he has certainly employed unusually large doses, yet even in regard to the use of these large doses, he could find medical authority in his favour, should it be necessary for him to defend himself."

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* *Vid.* Casper's Vierteljahrsschrift, I., s. 79, &c.; and *ibid.* III., s. 280, &c.; also *ibid.* XII., s. 228, &c.; and also Annales d'Hygiène, publ. 1858, IX., s. 328.

This explanation quashed the matter, and no further accusation was brought against the accused "poisoner."

CASE CCCXXVII.—CHARGE OF MURDER OF A NEWBORN CHILD DURING THE BIRTH, BY THE MIDWIFE.

A mature female child was stillborn, and the midwife was accused of having caused its death during delivery, by putting a towel round the neck of the child, and thereby throttling it. The accused denied this, and stated that she had only put the towel round the shoulders of the child to enable her to hold them firmly.

Right round the neck of the body there ran the double mark of a cord, three lines broad, two lines deep, soft to cut, white, dark-red on only a few patches, and in these places ecchymosed (*Vid.* § 112). The lungs were unusually heavy for a stillborn fœtus, since they weighed about three ounces, six drachms (imp.). They were dense, bright-brown, not marbled, and were retracted; only the middle lobe of the right lung floated, and neither here nor in any other part of the lung was there any bloody froth or sound of crepitation perceptible on incising them, and this was all the more remarkable that the body was quite fresh, and not the slightest idea of any putrefactive action in the lungs could be entertained. Blood was effused over the whole surface of the brain. We decided that the child had very probably made a few attempts to respire during the birth, and was then stillborn; that apoplexy had been the cause of death; that the mark of the cord had been caused by the umbilical cord being twisted round the neck (as had also been stated by the midwife), and, finally, that the dissection had not revealed any cause of blame against the midwife.

Accordingly in this case also, no formal accusation was brought against the accused.

CASE CCCXXVIII.—DEATH FROM CHLOROFORM, ADMINISTERED FOR THE PURPOSE OF HAVING A TOOTH EXTRACTED.

This is the mournful case referred to at p. 283 (Vol. II.), the first case which has been the subject of medico-legal inquiry in Germany, while in England, the Coroner has already had several such cases before him. A young married woman came one summer to the dentist W., to get a tooth taken out; according to his statement he poured from ten to twelve drops of chloroform upon a piece of sponge, covered it with a napkin, and held it under the patient's nose, whereupon, after a few seconds, she "sat motionless," but speedily awoke. The operator then poured from twelve to sixteen drops more upon the bit of sponge, and soon after a third instalment of from four to five drops. After the second application the patient had eructation, and a yellowish fluid and white froth flowed out of the mouth. The woman's countenance became livid, she stretched herself out as dying persons often do,—and died then and there.

Fifty hours after death we made a medico-legal examination of the body in consequence of the dentist having been accused of "homicide by neglect." Putrefaction was unfortunately already far advanced. Within the cranium, the small amount of blood contained in the vascular meninges was remarkable, and we distinctly saw small air-bubbles in the larger venous trunks. The brain contained no unusual amount of blood; the transverse sinus was tolerably well filled, the others almost empty. But lungs contained but little blood, this was, however, *fluid, and of the colour of cherry-juice.* Within the pericardium there was only the usual amount of fluid; the *heart was perfectly flabby and quite collapsed,* its coronary vessels and all its cavities were quite empty of blood. The larynx and trachea were already coloured internally of a brownish-red from putrefactive imbibition; they were perfectly empty, and contained not a trace of bloody froth or the like. The liver was anæmic, the spleen, on the other hand, tolerably well filled with cherry-juice-like blood. The stomach was empty, its mucous membrane of a bluish-red, mingled with a few dark blue patches. The omentum and mesenteries contained no blood, the intestines and kidneys were stained of a dirty-red by putrescence, and the latter contained much blood of the nature described. The urinary bladder was empty, and the vena cava ascendens contained no blood.

In giving our opinion, we stated at first the difficulties in the way of deciding any such case, and particularly this one: the (then) novelty of the drug, the ignorance in regard to its actual mode of action, and, therefore, in regard to its best mode of administration, the rarity of fatal accidents from chloroform, so far as known, not above five or six altogether having then occurred in every quarter of the globe. To these was superadded in the present case, the highly putrefied condition of the body, by which all the appearances were obscured and made indistinct. "Nevertheless, it was possible to recognise several appearances in this body, which agreed tolerably well with those which had been hitherto seen in the most of such cases which had occurred in England, France, and the East Indies. These were, the condition of the heart, which was quite flabby and collapsed, and this was all the more remarkable, as the woman was in good condition, young, and healthy, the coronary vessels and all the cavities of the heart were quite empty, so that this case also seemed to corroborate the supposition that sudden paralysis of the heart is the real cause of death in cases of fatal chloroform-narcosis—the presence also of air-bubbles in a few of the larger cerebral veins, which had been observed in at least one of the known analogous cases; but in regard to this appearance we must leave undecided; to say the least, the share in its production which may have been taken by the putrefaction—further the very remarkable condition of the blood, and finally, the tolerably great degree of anæmia of the body, which has also been observed in other cases, but in regard to this also respect must be had in the case of the deceased to the highly putrefied condition of the body, as we find that this as it advances produces more and more an apparent anæmic condition of the body. To this we may add, that a microscopic examination of the stomach, subsequently carried out, revealed nothing but what is usually found in every putrefying stomach when thus examined, and also that an attempt to prove the existence of chloroform in the blood, which, however, is not yet determined to be possible, could not be successful, because the blood was already altered and decomposed by the process of putrefaction. In spite of all these considerations, it is not to be disputed:—1. That J. permitted a drug to be administered to her by inhalation, which can and has killed both animals and men in the very same manner. 2. That the deceased had died precisely as in all those cases of accidental death in man hitherto observed, namely, by a sudden loss of the vital powers preceded by very transitory convulsive movements. 3. That there was nothing peculiar to the woman J. which could otherwise explain such a peculiar and sudden form of death. In accordance with these facts, there seems certainly to be in this case a causal connection between the administration of chloroform and the death which followed it. In respect, however, of the difficulties hinted at, we can only conscientiously answer the first question propounded to us by saying, "that there was the highest probability that the woman J. had died in consequence of the inhalation of chloroform." "We can answer with much more certainty the second question in regard to the probability of there being any carelessness on the part of the accused in the administration of the drug." We first pointed out that W. had committed no fault by using, as a licensed dentist, chloroform during his operations, and we then continued:—" he would, however, have been guilty of carelessness had he employed the drug in a dose, or after a manner from which he might have dreaded an injurious and possibly fatal action 'according to the ordinary general amount of information he is expected to possess' (words of the then penal code). But, in the first place, in respect of the mode of administration employed, W. has used the one by far most frequently employed, and though others employ peculiar inhalation apparatuses, it is as yet by no means settled which of the two methods deserves preference, on the contrary this is much disputed; in respect, therefore, of the mode of administration, W. deserves no blame. The consideration of the dose employed is, however, far more important, and in doing this two circumstances force themselves on our attention. First of all, there is our own observation of the sealed bottle which was produced to us at the time of the dissection, it would have contained about one ounce (imp.) of chloroform when full, but in it there were only three drachms (imp.). It is evident, however, that nothing can be deduced from this, since we do not even approximatively know the quantity contained in the phial before W. commenced the operation. Of more importance in regard to this, is the statement deponed by Dr. K., who was at once called in, that on his entrance into the room where the woman lay just expired, he found it so full of chloroform vapour that his head felt confused, and he was compelled to open the window, which certainly leads to the conclusion that there was a large quantity of chloroform mingled with the air of the apartment. Whether this was, however, produced by evaporation out of the bottle which Dr. K. found uncorked, or whether by any accident chloroform had got spilled out of it, and then evaporated off the floor, cannot now be determined. We must, therefore, accept the statement of the accused himself, who says, that at first he poured ten or twelve drops of chloroform, the second time again from twelve to sixteen drops, and the last time from four to five drops upon the little piece of sponge, the trifling size of which would of itself have been sufficient to prevent it taking up any considerable quantity. According to all our present known experience, however, in regard to the use of this drug, we must declare these quantities to be carefully and discretely chosen, since they are very considerably exceeded by operators in general, without any injurious after-results. There is, therefore, in the whole of the case, no sufficient reason for accusing W. of carelessness in his mode of procedure, and we reply to the second query thus :—that, according to the evidence produced, W. has *not* been guilty of carelessness in the employment of chloroform."

After the very many cases in which I have since that time, in my own and still more in the clinical practice of my operating colleagues, seen chloroform given with very much greater, and in one case observed by myself, which terminated quite favourably, with truly frightful audacity, I can even yet only confirm the opinion then given.

CASE CCCXXIX.—FATAL RUPTURE OF THE UTERUS DURING PARTURITION.—ACCUSATION OF THE ASSISTING "WICKELFRAU."

A "wickelfrau" in Berlin is, analogous to our monthly nurse, a woman who attends upon women just delivered and new-born children, but occasionally also, and only too willingly, she undertakes deliveries also, for which she is wholly incompetent. A woman of this kind had, in August, 18—, illicitly delivered a woman, aged thirty-nine years, who had already given birth to eight children, and who this time died during delivery. An accusation was now made against the wickelfrau. It was distinctly ascertained, that she had done nothing to the woman in labour, except give her a clyster, and some coffee with cinnamon drops in it. She was called to the parturient woman about midnight; about four hours subsequently the latter complained of violent pains in the belly; her appearance struck the wickelfrau, who requested that a medical man should be immediately summoned; one came immediately, but found the woman already dying, and extracted the child, which was dead, with the forceps. At the medico-legal dissection, which was undertaken two days after the death, the following were the more important appearances found: the back was green from putrefaction, the epidermis already peeled off in many places; the breasts contained milk; the abdomen distended like a peaked mountain; the vagina much dilated, its mucous membrane covered with watery blood, its posterior wall was prolapsed, so that it protruded visibly through the dilated vulva. The whole of the intestinal canal was much distended with gas; there was about a pound and a-half (imp.) of fluid blood in the abdominal cavity; the abdominal organs and veins were anæmic; the peritoneum was of a dirty brownish-red from putrescence; the uterus was ten inches long, its fundus six inches broad; in its posterior wall there was a rupture six inches long, running upwards from the cervix with tolerably clean ecchymosed edges, which, as well as the lower third of the uterus, were only from three to four lines thick; the fundus, however, was an inch thick. The cavity was entirely empty. The conjugate diameter of the pelvis measured three inches and a-half. There was nothing else unusual found except general anæmia. Of course in delivering our opinion, we first of all assumed death to have been caused by rupture of the uterus. "The only question is," we went on to say, "whether the accused has been actively or passively the cause of this rupture having taken place?—This is not to be supposed. Rupture of the uterus is, fortunately, a rare occurrence during parturition, and a case such as this, where the uterus is ruptured with the head presenting, and the position of the child thus neither cross nor askew, and where no attempts at turning have been either made or intended, deserves to be reckoned among the rarities of obstetrics. In a few instances rupture of the uterus has been produced by rough usage with the forceps or other obstetrical instruments, or even by manual examination. But it has been distinctly ascertained, by the deposition of the husband, that no instruments were employed by the accused, and that she did not even make such a rough or violent manual examination, as might have ruptured the uterus; this is proved by the fact, that the evidence nowhere mentions any complaints of violent pain as having been made by the deceased during the repeated examinations of the nurse. This has rather been a case of spontaneous rupture, and its origin is explained by the dissection revealing, that the whole of the inferior third of the uterus was of the quite unusual tenuity of three to four lines, and in this portion the rupture took place, which is a rare occurrence. Such a condition of the uterus cannot be suspected, let alone ascertained during life, and therefore observations are not wanting in which even renowned obstetricians have met with such fatal cases of rupture of the uterus. Finally, we need scarcely mention, that the remedies ordered by L., the lavement, the coffee, and the tincture of cinnamon (of the latter of which only a small quantity could be given, since all that came into the house cost only about one penny sterling), had no share in producing the rupture." Accordingly we decided, that the accused was not to blame for the occurrence of the rupture of the uterus, and the death of the deceased thereby produced; thereupon she was only sentenced to the usual police punishment for practising obstetrics without a license.

CASE CCCXXX.—ADHERENT PLACENTA. ACCUSATION OF THE "WICKELFRAU."

Another "wickelfrau" had delivered a woman, aged thirty-two, of her first child, who died on the fourth day after her confinement (in January). The uterus was still eight inches long, five inches broad at the fundus, and its walls were one inch thick. On the anterior wall there was a piece of placenta four inches long by three broad, firmly adherent. Death had been caused by hæmorrhage, which was distinctly evident from the universally anæmic state of the whole body. At the time of the dissection we stated, in our summary opinion, that with so firmly adherent a placenta, no conclusions could be drawn from the dissection merely, as to there having been any unscientific procedure at the accouchement. No reasoned report was subsequently required, wherefore it is evident that our summary opinion sufficed to quash the accusation of homicide by carelessness.

CASE CCCXXXI.—STILLBORN CHILD. ACCUSATION AGAINST THE PHYSICIAN.

The termination of this case resembled that of the one just related, it was one in which I was called abroad, to determine, by means of a medico-legal dissection, how far there was any reason to blame *a physician* for the death of a child which he himself had delivered. The mother was a healthy primipara, aged twenty-eight years. The labour was said to have been tedious, and the physician was called during the night. For one hour and a-half he made fruitless attempts to extract the child with the forceps, and then went off during the night, saying to the woman, whom he left lying alone, (!) "that now the child would come of itself." Two hours subsequently the child was born, but dead. The father complained. The child weighed ten pounds, and was correspondingly well developed; its head presented the following considerable measurements: three inches and a-half tranversely, four inches and three-quarters longitudinally, and five inches and a-half diagonally, the diameter of the shoulders was six inches and three-quarters. On the right side of the forehead there was an ecchymosis the size of an almond, produced by the application of the forceps: the whole of the forehead was somewhat swollen; the body (in December) was still quite fresh. The docimasia pulmonaris proved that the child had been stillborn, and the dissection revealed a very distinct hyperæmia within the cranium. We decided, in regard to the special queries put before us: that the child was mature, that it had died before its birth from apoplexy, and had been stillborn; that, from the dissection it could not be deduced that the application of the forceps had produced death, nor that a continuous application of the forceps would have prevented it. In this case, also, the accusation was quashed.

CASE CCCXXXII.—SUSPECTED HOMICIDE BY MALAPRAXIS DURING DELIVERY.

This was an interesting case of itself; it might have been more difficult to decide it forensically, but this was not required of us. In consequence of a bad labour, which had lasted for fifty-four hours, and during which the forceps were five times applied, a girl, aged twenty-one years, died six days subsequently. The medico-legal dissection, which had, alas! been preceded by a private one, revealed the existence of gangrene of the vagina and of the uterus; the latter still rose a handbreadth above the pubis, and was of the size of two fists. Its substance was soft and flabby, its internal surface was entirely of a blackish grey, particularly towards the cervix; its substance on this internal surface was loose, softened, and fell into rags at the slightest touch. The peritoneum was only faintly reddened. In the posterior portion of the ashy-grey wall of the vagina there was a laceration one inch long. The cause of death, therefore, was easily determined. Whether, however, death had been caused by malapraxis could not, of course, be decided without a knowledge of the circumstances preceding the event. No further inquiry was, however made, for reasons which are to me unknown. Thirty-four years ago, when I was a member of the medical college here, a perfectly similar case came before us, which very much divided the opinions of the members; that of the majority was, however, unfavourable for the accused obstetrician, who was, of course, very properly blamed for not having early enough recognised and treated the gangrene of the vagina. (A considerable rupture of the perineum had occurred during labour, and the case happened in the midst of a hot summer.*)

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* *Vid.* Case CCCLXIV.

CASE CCCXXXIII.—SUSPECTED HOMICIDE BY HOMŒOPATHIC QUACKERY.

Several years ago, a certain so-called "Professor" Pantillon was, for some time, a nuisance in Berlin, practising a so-called Homœopathy without a medical license; this case was finally the cause of his banishment.

On the 26th of May, 18—, died the son of N. M. aged three years and a-half. He had suffered from a congenital rupture, and, as appeared from the evidence, subsequently from an "opacity of the cornea." About Easter, his mother consulted the quack mentioned, who gave her homœopathic globules, after which the rupture and the affection of the eyes were both said to get better, (!) and yet, at the same time, the child was, according to his mother's statement, so lazy that he would no more go out, slept almost constantly, and also perspired a great deal. The "Professor" gave new globules; after which the child "became much worse, remained constantly in bed, had no appetite, was constantly drinking, and emaciated visibly." Six weeks had now elapsed since the first consultation. In another week, the child became worse, and the "Professor" did not come to its aid, although requested by the mother. On the 25th of May, the child was seized with violent convulsions, which continued uninterruptedly till next day, when it died. A practising physician, Dr. W., called in on this the last day of the child's life, prescribed leeches and clysters; but the child died about midday, in the midst of the most violent convulsions, after the "Professor's assistant" (!) had appeared with a book and a box of medicines (!), and had given something—*to smell.* (For his trouble, the "Professor" had each time received sixpence sterling, eighteenpence in all.) The remedies employed by him were, according to his own statement in the subsequent investigation, belladonna, aconite, nux vomica, and Ignatius' beans. We had to make a medico-legal dissection of the body after the mother had raised a complaint against the "Professor." The body was much emaciated, the cranial bones were very much congested, as were also the vascular meninges. In both of the much dilated lateral ventricles there was about three ounces (imp.) of serum, and all the sinuses were distended with blood; the other appearances within the cranium were normal. Both lungs were very tuberculous, there were several tubercles already softened; the spleen was crowded with tubercles;

and there were also a few tubercles in the pancreas. The other organs presented nothing remarkable. In the opinion which we delivered, we stated, that the child had died from dropsy of the cerebral ventricles, which requires no justification here, and we also pointed out the position which the scrofulous dyscrasia holds in the etiology of this disease in general, as well as in this particular case. We further went on to say, that according to all medical experience, this most serious and dangerous disease was only curable by the employment of energetic treatment at its commencement and during its first stages, and we then continued:—"But 'Professor' Pantillon acted otherwise. It cannot be supposed that he, as a non-medical person did, or could accurately recognise the origin and development of this disease as described to him by the mother, but rather that he continued, to the complete neglect of any other more powerful treatment, of which indeed he was ignorant, to administer the so-called homœopathic globules, that is, small particles of sugar and starch, perfectly indifferent in a medical point of view, seeing that their nominal contents of belladonna, aconite, nux vomica, and Ignatius' beans has been by the so-called homœopathic dilutions, attenuated to *nil*. And for this very reason, it cannot be supposed that the treatment of the child by P. has produced its fatal disease, or even positively increased it or favoured its fatal termination. On the other hand, we must, in accordance with the experience of medical science, assume that, entirely independent of his being licensed or unlicensed, his treatment has been negatively injurious, by taking the place of the only true remedies and method of treating this child's disease which could possibly have been efficacious; and for want of this the disease has run its natural course through all its stages up to the fatal compression of the brain by serous exudation, as proved by the final convulsions and by the dissection." Accordingly, we gave it as our opinion:—"That the fatal issue of the disease might have been averted by an energetic treatment conformable to experience, and that the treatment adopted by P. has not been such." The police side of the matter was not in question, as that was clear to the Judge without the opinion of any expert. The judicial question as to the share the treatment had in producing death could not be answered more favourably for the accused, and, in my opinion, ought not to be answered with more severity.

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